5-2014

Brownfield Redevelopment and Strategies: Repurposing Existing Maine Waterfront Land

Colin N. O'Donnell
University of Massachusetts - Amherst, codonnel@larp.umass.edu

Brownfield Redevelopment and Strategies:
Repurposing Existing Maine Waterfront Land

Master's Project By:

Colin O'Donnell

Brownfield Redevelopment and Strategies:
Repurposing Existing Maine Waterfront Land

Master's Project By:

Colin O'Donnell

Master's in Landscape Architecture

Department of Landscape Architecture and Regional Planning
University of Massachusetts at Amherst

Committee Chair:
Michael Davidsohn, MCLP _____

Department Head:
Elisabeth M. Hamin, PhD _____

Committee Member:
Mark Lindhult, FASLA _____

Acknowledgments

The Master's Project process has opened my eyes to a much broader context within the Landscape Architecture discipline in conjunction to the vast amount of knowledge I have already learned here at University of Massachusetts at Amherst. I appreciate the knowledge I have gained from the entire faculty.

I would like to thank my committee chair, Michael Davidsohn for all his support and guidance throughout my entire Master's experience. It has been great to learn from someone so like minded.

I would also like to express my thanks to my other committee member Mark Lindhult, and all of his valuable input into the creation of this Master's Project.

To my parents, I want to thank them for their support and guidance throughout my college experience. Without you everything I have accomplished wouldn't have been possible.

Finally I would like to thank my soon to be wife, Sara and everything you do. Without your support and patience I would not have been able to do what I needed to. I love you forever and always.

Abstract

Brownfield sites are a major problem in our urban areas that create hazardous environmental conditions, health risks and have been linked to lowered neighboring property values and crime. This project will focus on a contaminated site, located in a rural setting, and designing a reuse strategy fitting for local vernacular and the community as a whole. This site is important to the community because of the huge impact it currently has such as contaminated groundwater and soils, lowering property values, and is a blighted property. By revitalizing the 39 acre waterfront site in Waldoboro, Maine these impacts can be reversed and can be viewed as an asset to the community not a hazard. The goal of this project is to develop a community revitalization plan that incorporates remediation practices, includes visual education for the community, and complete reuse strategy for the site to revitalize the community. Brownfields are justifiable projects due to their threat to the environment and misuse of valuable land. These sites provide a prime location to apply artistic and scientific principles as is the definition of landscape architecture and revitalize built environments which were previously unsafe and even hazardous to human health and well-being.

Tables & Figures

Contents

Chapter 1

Introduction

Brownfield sites are a major problem in our urban areas that create hazardous environmental conditions, health risks and have been linked to lowered neighboring property values and crime. (Hollander, 2010; Sousa, 2003) Brownfields have also been linked to urban sprawl which is a phenomenon that causes development to locate further away from city centers. Brownfields are a contributor of urban sprawl because of unusable, contaminated sites located near major water ways and city centers forcing development further away to the suburbs. (Geltmen, 2000; Hollander, 2010) This results in people developing valuable greenfield sites rather than redeveloping sites with existing infrastructure. A "Brownfield site" means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. (EPA, 2002) Many strategies for revitalizing brownfields in dense urban areas have been very successful. The same strategies for brownfield revitalization and development found in urban centers can be applied to rural areas similar to the location of this project site. Remediation and revitalization strategies implemented in dense city centers will be transferred to a rural site setting located on Maine's beautiful coast. Statistics show that for every "acre of brownfield site redeveloped approximately 4.5 acres of green space are preserved" (Sarni, 2009, pg. 227) making revitalization of previously developed sites extremely important for a green future.

An Osram Sylvania Inc. light bulb factory, provided approximately 200 jobs at its peak in Waldoboro, Maine. When the company left the area it left the property with contaminated groundwater and soils with volatile organic compounds which have grave impacts on the small town. Osram Sylvania Inc. currently is still the land owner of this parcel and is in charge of the remediation process. Community impacts, reuse strategies and design, and remediation technologies will all be analyzed in depth for this particular site. Open green spaces surround the area making it necessary to revitalize previously developed land allowing the integrity of the surrounding local region to remain intact. Successful revitalization projects and strategies successfully completed around the world will be analyzed in order to apply effective strategies to the project site.

A number of brownfield projects are finished once remediation has taken place and the contamination is removed from soils and groundwater. Both the procedures of the Maine Department of Environmental Protection Remediation Program Guidance and the brownfield procedures of Hollander, stop the transformation of brownfield revitalization at the remediation stage. It is important, especially in rural areas, to use those severely altered and once developed sites as a reuse to help preserve the development of greenfield sites. Reuse strategies are the next major step in the brownfield process. Restrictions will be analyzed, site location and terrain, and town planning will be taken into account when evaluating the best reuse option for the former Sylvania light bulb factory.

This project will look at brownfield remediation strategies currently under construction at the site by the Maine DEP and compare them with other current strategies. Sustainable cleanup strategies, such as phytoremediation, will be evaluated for relevance to see if any would be applicable to the site. Reuse of land is important for the community involvement process, allowing people to see the effort needed for revitalization.

In order to arrive at the final master plan, several steps will be taken to determine the best possible reuse of the contaminated site. Site analysis is one of the most important steps which determines what type of contamination is present on-site, what types of restrictions are associated with contamination, and investigation of community documents to determine what will be the best reuse options for a 39 acre waterfront site. From this point a worst case scenario exercise can be performed to analyze the possibilities of site redevelopment which will determine non-sustainable practices allowed under the regulations of this site. After site analysis, actual master planning will create one redevelopment option which best suits the community and a previously environmentally damaged site.

1.1: Scope

The Sylvania site presents several interesting issues, all of which will be looked at in depth in the remaining chapters. Currently the site is still privately owned in the name of Osram Sylvania Inc. which provides some interesting challenges with town planning and reuse options. The soils and groundwater are contaminated with Volatile Organic Compounds (VOC's) which by definition makes the site a brownfield, creating the need for effective revitalization strategies. With the site being classified as a brownfield, certain restrictions have been put on the property and surrounding community. Currently the planning of the 39 acre, riverfront property concludes with the remediation stage in the process without any analysis of future reuse of the property.

Landscape Architecture as defined by the American Society of Landscape Architects "is the profession which applies artistic and scientific principles to the research, planning, design and management of both natural and built environments. Practitioners of this profession apply creative and technical skills and scientific, cultural and political knowledge in the planned arrangement of natural and constructed elements on the land with a concern for the stewardship and conservation of natural, constructed and human resources. The resulting environments shall serve useful, aesthetic, safe and enjoyable purposes." (ASLA, Glossary) Brownfields are an important tool for landscape architects because they are contaminated resources only few of which are reused to create aesthetically pleasing and functional redevelopments. Brownfields are justifiable projects due to their threat to the environment and misuse of valuable land. These sites provide a prime location to apply those artistic and scientific principles and revitalize built environments which were previously unsafe and even hazardous to human health and well-being.

This project will analyze each issue individually in order to produce an effective revitalization strategy as well as a reuse strategy that best fits the site as well as the community. The final products will take each phase of the process into account, addressing each issue presented.

1.2: Goals and Objectives

The location of this site is relative to the historic downtown area which itself has a revitalization proposal in place. The town of Waldoboro is a town seeing residents leaving along with jobs, infrastructure is crumbling, and sites are being abandoned such as Osram Sylvania. The goal of revitalizing this site is on a much larger scale then the remediation of groundwater and soils on 39 acres on the water. It is revitalizing a small town in Maine with a strong marine and agriculture history into a community proud of its heritage. The reuse goal of the old Sylvania site is to meet the needs of the community and give back a section of town that has seen property values drop, increase in crime, and an aesthetically displeasing foreground to an otherwise picturesque landscape. Town comprehensive planning documents will be utilized to find the best reuse option for the project site.

Goal:

- The goal of this project is to develop a community revitalization plan that incorporates remediation practices, includes visual education for the community, and complete reuse strategy for the 39 acre site to link a historic downtown and revitalize the community.

Objectives:

- Review and compare between the sites proposed remediation strategy and remediation strategies investigated through research.
- Analyzing related case studies of successful projects in Maine to obtain state level procedures on revitalization, funding and reuse strategies
- Research sustainable brownfield strategies (policy, funding, remediation and reuse) and apply them to the specific future goals and objectives for the town of Waldoboro, Maine.
- Analyze the Waldoboro comprehensive plan and downtown revitalization plan in order to determine the most favorable use of the project site.

Chapter 2

Literature Review

America has a long and illustrious history of manufacturing goods to fulfill domestic demand and provide products around the world. Unfortunately, much of that production took place with a disregard for the environmental impacts. Today, many old manufacturing facilities have become what are known as brownfields. “Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant,” (EPA.gov, Brownfields) as defined by the U.S. Environmental Protection Agency. If a Brownfield is developed land with some degree of contamination then, “its companion term, greenfield, refers to a yet undeveloped ground, implying that the very act of development might render it, to some degree, brown. (Gans, pg. 5) Both of which are in a general sense, the options to choose from when perusing development opportunities. It is unclear exactly how many brownfields sites there are but some estimates are “more than 500,000 brownfield sites nationwide that contain some level of environmental contamination. The collective cleanup cost for these sites has been estimated as $650 billion.” (Geltman, pg. 5) Remediation and Reuse of brownfields sites is not a new idea but an ongoing cleanup of Americas neglected industrial past.

Brownfields provide a significant option in the sense of sustainable urban planning strategies. “Research has shown that development of greenfields sites on the exurban fringe is a key contributor to greenhouse gas emissions, energy use, pollution, and natural-resource consumption.” (Hollander pg. 4) This is contributed to a longer commute time, destruction of farmland or open space, and larger, more widespread development as opposed to the dense development of brownfield sites which are typically found near urban centers. “Ultimately, sustainable development means finding an approach to brownfields reuse that offers the most significant long-term benefits to the local community, taking into account environmental, economic, and other quality-of-life measures” (EPA, Sustainable Reuse, pg. 1) and not developing previously undeveloped land. Largely these sites are located in urban centers and even in rural parts of the country, on major transportation routes and have existing infrastructure on site making them ideal for reinvestment.

2.1: Brownfield Remediation Strategies

The local community adjacent to a brownfield site is critical in the decision making process when planning to revitalize a brownfield site. The National Association of Development Organizations describes community buy-in one of the hardest obstacles to overcome in remediation projects because “of the belief of documenting a contamination will lead to local financial hardship, costly cleanups and difficulty in property re-sale or in ability to reuse the property for desired purposes.” (NADO, 2004) Once that initial fear is overcome, the EPA experienced “the community actively became involved in the reuse decision process… and ultimately was considered one of the project’s greatest successes.” (EPA, Sustainable Reuse) After the initial community buy-in and success, there will be continued improvements in quality of life and reinvestment in the community. This is potentially the greatest key strategy to redevelopment of brownfield sites.

“For the purposes of the Brownfields Program, environmental “cleanup” and “remediation” are terms used interchangeably by recipients to refer to actions taken to respond to a hazardous material release or threat of a release that could affect human health and/or the environment.” (EPA, Brownfields) Remediation is the process in which pollution and contaminants are treated or removed from environmental media such as soils, surface water, groundwater and sediment. There are many levels of brownfield contamination, types of contamination, and many different complications that arise from property ownership and contamination responsibility. The different levels of contamination as described by Thompson are derelict sites, brownfields/landfills, and toxic waste sites. (Thompson, pg. 72) Types of contamination can range from volatile organic compounds, semi-volatile organic compounds, pesticides, metals and polychlorinated biphenyl (PCB) all of which have certain negative effects on human health. All of these different factors help determine remediation strategies appropriate to each particular site. Table 1 describes the four stages of readiness for development of brownfields. This also is a first view of the level of state and federal involvement with investment and parties responsible for remediation.

Table 1: Stages of Government Involvement in Brownfields Sites

Stage 1: Strong real estate market	Private sector absorbs costs	State and federal environmental regulations add costs but do not deter project
Stage 2: Brownfield Traps	Business owner afraid to sell, lease, refinance, or expand	State transfer triggers statues State voluntary cleanup programs State amnesty programs
Stage 3: Mothballed property	Property sits idle and dirty	No current law dealing with this problem – the reluctant seller
Stage 4: Tax-delinquent properties	Government must clean up	CERCLA and state equivalents Environmental lien laws State nuisance statues RCRA

State Legal Responses (Geltman, pg. 68)

Remediation technologies are broken down by the contaminant present and also by technology degree of usefulness. All of which consider approaches with consideration to cleanup efficiency, schedule, and goals for contamination concentrations. "Several different technologies exist for addressing the same compounds or class of compounds, and each technology will present unique advantages, disadvantages, and footprints at a specific site." (EPA, Brownfields) Remediation technologies are defined by contaminant removal, time, effect on the environment, and cost, making it possible to match a specific technology to site specific characteristics. (Hollander, pg. 29)

For remediation strategies Hollander describes five general approaches. "These range from most intrusive on-site to least intrusive: full cleanup, partial cleanup (in-place), full concealment, and nonintrusive cleanup, each determined by the environmental site professional." (Hollander, pg. 39) These approaches of "remedial action can range from the removal of a modest amount of soils, with limited disturbance to the site and its eventual redevelopment, to large-scale engineering works that demolish derelict buildings and remove all of the site's soils and water bodies." (Hollander, pg. 22) The scope of which depends largely on contamination concentrations and their threat to the environment.

Remediation technologies are separated into three main categories based on proven performance and amount of data on effectiveness. These categories help the site professional determine the amount of risk associated with certain technologies. Specific remediation technologies are discussed in Chapter 4: Methodology.

1. Established Treatment Technologies ETT for which costs and other performance information is readily available.
2. Innovative alternative treatment technologies IATT who's routine use on brownfields are inhibited by lack of data on performance and cost. Currently, they have limited full-scale application.
3. Emerging alternative-treatment technologies EATT whose routine use on remediation sites is inhibited by lack of data and evaluation of claims. They are currently found in laboratory test plots and in full-scale pilot-site testing." (Hollander, pg. 30-31)

Site specific approaches to brownfield remediation strategies help shorten length of cleanup time, reduce impact on site, and allow the site to be utilized by the community while undergoing remediation. "One significant issue regarding brownfields remediation is that more than one pollutant is usually found on the site in soils and groundwater …mixing together as a 'cocktail' of contaminants." (Hollander, pg. 26) A "train" of remediation technologies specific to site conditions is the use of different techniques working together to clean up the cocktail of contaminants found on-site. By considering remediation strategies that are able to treat contamination together at different levels in a train, the remediation time can be reduced and the contamination levels can exceed regulatory requirements. When remediation strategies are in a train, designers and engineers can plan to eliminate components when their part of the remediation is completed. This is particularly useful when there is more than one contaminant being treated. This will help cut down on energy consumption by not treating for contamination that is already at acceptable levels. In order to get the community educated and involved, adding technologies such as phytoremediation and constructed wetlands allows people to see remediation in action and interact with something long viewed as dangerous. (EPA.gov, brownfields)

2.2: Brownfield Funding and Policy at Both Federal and State Levels

Environmental policy, liability, and remediation funding has advanced through history because of the ever growing advancement in cleanup technologies and awareness of the benefits of brownfields and the dangers of leaving sites contaminated. Some of the benefits include preserving greenfield sites, accessing existing infrastructure, and fixing related environmental damage. (Hollander, 2010, Sousa, 2003) “Brownfield policy brings together a variety of urban goals and interests such as housing provision, sustainability, economic opportunity, and community social capital and empowerment.” (Hula, pg. 13) Starting in the early 1970’s through to the 1980’s, the federal government enacted a list of environmental policy in order to help stop pollution and to start cleaning up already contaminated environments. Table 2 shows the increasing involvement of the federal government starting with levels of water contamination in 1970 to the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) which determines responsible parties, federal brownfield cleanup funding and gives government the tools necessary to respond to problems created from abandoned hazardous wastes. (Geltman, pg.34)

YEAR	GOVERNMENT INITIATIVES
1970	The Clean Air Act (CAA)
1972	The Clean Water Act (CWA)
1973	The Endangered Species Act of 1973 (ESA)
1976	The Toxic Substances Control Act (TSCA)
1976	The Resource Conservation and Recovery Act (RCRA)
1980	Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA)
1990	The Oil Pollution Act of 1990 (OPA)
2002	Small Business Liability Relief and Brownfields Revitalization Act
2009	American Recovery and Reinvestment Act (Stimulus Bill)

Table 2: Federal Government Brownfield Environmental Policy

Before 1970 and the start of the involvement of the federal government, transfer of property relied on caveat emptor or “buyer beware” which transferred responsibility of environmental issues to any unknowing buyer. The Comprehensive Environmental Response, Compensation and Liability Act of 1980 was specifically designed to address brownfield sites after the Love Canal residential neighborhood was built over an abandoned hazardous waste site and there was no legal responsibly attached to the contamination. After

the act was passed, the federal government had the "ability to hold responsible parties accountable for the costs and responsibility of cleanup." (Geltman, pg. 34)

An amendment to CERCLA is the Small Business Liability Relief and Brownfields Revitalization Act passed in 2002. "This act designates liability and doesn't fault owners who are unaware of brownfield contamination. (It) provides base numbers for funding of $200,000 for testing and site assessment and up to $1mil with a required 20% match for site cleanup." (EPA.gov, Brownfields) "The Brownfields Law" helped to define the liabilities in CERCLA and provides funding to help strengthen brownfield programs at the state level. Then most recently, in 2009 The American Recovery and Reinvestment Act, or the "Stimulus Bill," was enacted where millions of dollars where allocated to different brownfield site characteristics, 600 million of which went to Superfund sites which are qualified brownfield remediation projects. (Sarni, 2009, pg. 58)

"Unquestionably, it is the states that have taken the lead in encouraging redevelopment of brownfields properties." (Geltman, pg. 67) Public funding, especially on the national level, is mostly reserved for site cleanup efforts where there is no properly identified responsible party, and "subsidies to reduce development costs below those of alternative sites are required. (Hula, pg. 2) The most common approaches on the state level include, state superfund programs and stakeholder adaptations to them, environmental lien laws, property transfer laws, and voluntary cleanup programs. (Geltman, pg. 67) Voluntary cleanup programs are more popular among professionals because it is a private party cleanup which reduces the amount of state paperwork and regulations. Typically, "many state-run voluntary programs offer added incentives to private parties to participate, including: technical assistance and flexibility in cleanup standards; liability assurances, and financial support in the form of grants and low-interest loans." (Geltman, pg. 68)

The national regulations of contamination cleanup are mostly used as guidelines for state regulations which, typically, exceed federal requirements. There are over 40 states that have such legislation in place. "Approximately twenty-one states encourage the reuse and redevelopment of contaminated industrial property through enacting brownfields

restoration and voluntary cleanup legislation." (Geltman, pg. 81)

The country is split into ten regions which help provide individual states with resources for introducing new policy. Each region has built off of each other in order to create working regulations, especially in the subject of brownfields. Region 1 consists of the Northeast Corridor which were the earliest to develop brownfield laws, meaning they reflect less sophisticated legal mechanisms then most because others learned from their mistakes. (Geltman, pg. 87)

Maine is located in the Northeast Corridor, part of Region 1 and has adopted the Voluntary Response Action Plan (VRAP) in 1993 which helps reduce the liability constraints on non-responsible property owners, prospective purchasers and developers, lenders, and trustees. (Genltman, pg. 84) The VRAP program consists of four stages a voluntary brownfield operation must perform to complete:

1. "A thorough environmental investigation is completed by the applicant's consultant resulting in a remedial action work plan.
2. The VRAP program approves of the work plan and issues a "no action assurance" letter to the applicant, outlining protections the applicant will receive if the remedial actions are satisfactorily completed.
3. The applicant's consultant completes the remedial actions outlines in the work plan and demonstrates that those are satisfactorily completed.
4. The VRAP program issues a "Commissioner's Certificate of Completion," which outlines the facts, conclusions, conditions, and assurances associated with the remedial actions at the site." (Geltman, pg. 95)

A significant tool used by state and local government is the Activity Use Limitation (AUL) which is directly linked to the transfer deed. This type of attachment to the deed is for brownfields properties which protects the past owner from continued liability from contamination by restricting the future use of the site to a less intense land use. "The most common type of AUL restricts properties with some residual contamination to commercial or industrial uses, prohibiting

residential or day-care uses." (Hollander, pg. 17) This strategy is important to note because there is a similar covenant attached to the project site where residential development is restricted from its land use for at least 20 years. (Benore, 2011)

2.3: Brownfield Planning and Reuse

Beyond the remediation process of brownfields, "sustainable development means finding an approach to brownfields reuse that offers the most significant long-term benefits to the local community, taking into account environmental, economic, and other quality-of-life measures." (EPA, Sustainable Reuse) The language of design and planning however, sometimes gets lost when in America most "remediation is driven by economics and litigation rather than by a conceptual framework of landscape, urbanism and culture." (Gans, pg. 6) However, when the community has a strong input into the strategies utilized in the reuse of brownfields sites, opportunities of community involvement presented themselves during the planning process including "meetings, work groups, committees, site visitations and educational tours," which spurred "planting events, walking tours, educational programs, monitoring of habitat, and coordination of cleanup activities." (De Sousa, 2003)

"As development sprawls outward along an ever-expanding urban fringe, forests are leveled and farms

destroyed to make way for cul-de-sacs, backyards, business parks, and, of course, acres of parking." (Thompson, pg. 71) By recycling existing sites in cities and older suburbs and even in rural areas, preservation of farms, forests, and natural areas surrounding cities is made possible.

Opportunities associated with redeveloping contaminated, unused sites are "these properties increase local tax bases, facilitates job growth, utilizes existing infrastructure, takes development pressures off of undeveloped, open land, and both improves and protects the environment. (EPA.gov, Basic Information) With all of these advantages of redevelopment "brownfields offer a more sustainable land development choice." (Hollander) Development on brownfield land not only utilizes existing infrastructure and reduces commute time and greenhouse gasses but it helps protect green open space. By developing approximately every "acre of brownfield site approximately 4.5 acres of green space are preserved." (Sarni, 2009, pg. 227) Environmental benefits are far more favorable to development of contaminated sites as opposed to greenfields sites.

Vegetation plays an important role in the restoration of a brownfields sites because the way "vegetation interacts with mineral earth, microbes, and climate to produce regional soil types" making soil and native re-vegetation an essential part of brownfield redevelopment. By eradicating invasive species and replanting with native species, local ecology can return to a previously habitable parcel of land. Landscape architects often focus on "aesthetics of place and environmental benefits that green space oriented redevelopment can bestow on urban areas, such as improving environmental quality of air, water, and microclimates, restoring natural habitats, enhancing recreational opportunities, and enhancing urban appearance." (De Sousa, 2003) Vegetation and local ecology play a very important role in the redevelopment of brownfields sites.

An important role of the designer, engineer, and site professionals is to help explain the complex science of remediation and the perceived public danger posed from brownfields sites to the community. By introducing remediation strategies to the public visually, community perception can change for the better. For example, phytoremediation takes some time to accomplish but can "be turned into an

a brownfields sites because the way “vegetation interacts with mineral earth, microbes, and climate to produce regional soil types” making soil and native re-vegetation an essential part of brownfield redevelopment. By eradicating invasive species and replanting with native species, local ecology can return to a previously habitable parcel of land. Landscape architects often focus on “aesthetics of place and environmental benefits that green space oriented redevelopment can bestow on urban areas, such as improving environmental quality of air, water, and microclimates, restoring natural habitats, enhancing recreational opportunities, and enhancing urban appearance.” (De Sousa, 2003) Vegetation and local ecology play a very important role in the redevelopment of brownfields sites.

An important role of the designer, engineer, and site professionals is to help explain the complex science of remediation and the perceived public danger posed from brownfields sites to the community. By introducing remediation strategies to the public visually, community perception can change for the better. For example, phytoremediation takes some time to accomplish but can “be turned into an advantage if each stage of the cleaning process has a distinct character and sense of place while performing remediation and simultaneously creating green infrastructure.” (Sleegers, 2010) Signage, community cleanups, and public awareness of remediation are important tools to help change the typically negative community perception of brownfields sites to being positive about a reuse of a particular site.

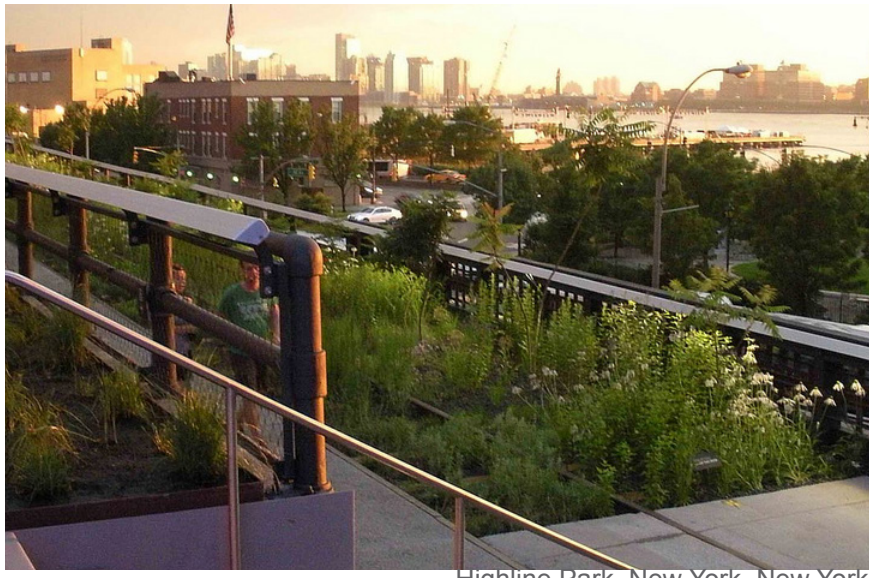
2.4: Rural Brownfields

Rural is a term used often to describe a geographic location with a certain feel. The U.S. census bureau has come up with several different definitions to describe rural in order to fulfill resource allocation to rural communities. There are many definitions of rural where “population thresholds used to differentiate rural and urban communities with a range from 2,500 up to 50,000, depending on the definition.” (Cromartie, Rural Classifications) Nearly all definitions place the project site into this rural classification. This is an important distinction because “NADO (National Association of Development Organizations) Research Foundation found that rural areas did not have ready access to resources, technical assistance and funding.” (NADO, 2004) This publication specifically “provides an avenue for small communities with little to no experience in Brownfields redevelopment and provides a comprehensive list of National, Regional, and State organizations that give technical assistance, grant writing, funding agencies, and case studies.” (NADO 2004)

There are several documented obstacles common to rural brownfields revitalization. The first is the inability to provide funding for inventorying, multiple assessments and a shortage of resources for remediation. Next is the ability of small organizations to dedicate the man power to access funding beyond Economic Development Administration funding and grants. There are funding organizations available for brownfields sites but requires allocation of town resources for writing grants. Along with difficulty in obtaining town resources for funding, there typically is a quicker turnover in staff and local elected officials in rural areas. Lastly, brownfields are not a high priority in rural areas because greenfield lands are readily available proving to be cheaper for developers. (NADO, 2004) In a survey conducted by Sousa, professionals were asked to state the main difference between developing a brownfield or a greenfield, a majority of which answered “lack of financial resources for planning, coordinating and undertaking remediation and redevelopment.” (Sousa, 2003)

Gas Works Park in Seattle, Washington, High Line, New York, New York, and Northside Park, Denver, Colorado are all great examples of award winning brownfield redevelopments in major cities. The following case studies are located in small towns in Maine that went through the process of funding, remediation technologies, successful reuse and community involvement in rural America. These projects give a good insight on the steps taken in order to create a successful brownfield project.

Gas Works Park, Seattle, Washington
commons.wikimedia.org



Highline Park, New York, New York
www.trendceteramag.com

Apollo Tannery, Camden, Maine

The historic Apollo Tannery is located in Camden, a small town on the mid-coast of Maine. The site was first developed as a woolen mill in 1887, chosen for its proximity to the Megunticook River. (EPA, Camden, ME) The woolen mill functioned for 66 years and later developed into a tannery for 46 years. Camden deployed an effective planning strategy by giving the land away for free, with a few restrictions on economic development, creation of year-round jobs, and a

Figure 2-1: Apollo Tannery, Camden, Maine Aerial

Google Maps

monetary deposit. The site is described as “commercially zoned, but in a residential neighborhood and consists of a paved lot, the tannery solvent-contaminated area and open space adjacent to the river.” (Steeves, 2010)

“Site soils and groundwater are contaminated with solvents and organic compounds” (EPA, Camden, ME) which have been polluting the adjacent Megunticook River. The Department of Environmental Protection was brought in, soon after the tannery closed, due to an odor coming from the buildings onsite reaching all the way to downtown. The odor ended up being the effects of improperly stored chemicals which were leaking. The site ownership transferred to the town in 2003 after the previous owner stopped paying taxes. With the new property, Camden residents formed a committee, the Apollo Tannery Redevelopment Work Group, to clean up the site and create ways of promoting the use of previously developed land.

Summit Environmental Consultants completed the remediation report in 2006. The remediation strategy for this particular site is a soil removal and slurry wall installation. The soils were transported to a nearby appropriate disposal site. The slurry wall acts as a barrier so the contaminated groundwater cannot migrate to the river. (Steeves, 2010)

“The future owner of the land will have to pay $200,000 up front. Then, for every eight workers hired, the owner will get a third of the purchase price refunded. The company will have five years to hit the 24 employee mark and get the full rebate of $200,000 before the offer expires.” (Steeves, 2010) $836,000 in June of 2005 was borrowed by the town in order to remediate and redevelop the site with $110,000 available to match the federal grant obtained for redevelopment. “The town in August 2007 won a $200,000 grant from the Environmental Protection Agency that would complete the cleanup of the site”

bangordailynews.com

(Steeves, 2010) Tax-increment financing was also explored for the potential developers of the site to provide a break on property taxes.

The cleanup was a success, bringing contamination levels down to acceptable levels and have stopped the contamination from getting into the Megunticook River. No development has taken place on site to date but there have been serious proposals presented to the town Planning Board. Another great success of this project was the Apollo Tannery Redevelopment Work Group which allowed community members to take part in the rehabilitation of this section of town. Together they incorporated restrictions on the property such as walk ways, public access to the river and most importantly job creation, even though the site is yet to be developed, this project is a model in community involvement and creative ways of dealing with brownfield redevelopment.

Eastern Manufacturing Corp, Brewer, Maine

The present day site of Eastern Manufacturing Corperation in Brewer, Maine was first developed in 1889 as Eastern Fine Paper. Eastern Fine Paper started as a "lumber mill, then moved to lumber and pulp, and finally became a pulp and paper manufacturer" (EPA, Former Mill) employing up to 900 people at its peak. In 2004, Eastern Fine Paper filed for bankruptcy leaving 430 people, nearly 5% of brewers population, out of work and left the site in a state of emergency response to contaminants that posed an immediate threat to the environment. The whole site consists of 41-acres and is located along the Penobscot River.

Due to the contaminants found onsite at the time the mill closed "EPA region 1 Emergency Response and Planning Branch performed a time-critical removal action." (EPA, Former Mill) Thousands of fluorescent light bulbs, mercury switches, thermostats, fire extinguishers, PCB ballast, and other chemical containers and oils were all part of the accumulation of contamination throughout the lifespan of the mill.

Cianbro in 2008, proposed a quick redevelopment time frame of only a year and a half after approval from the South Brewer Redevelopment LLC. It only took 10 months for Cianbro to remediate the site and start work on redevelopment. "By efficiently dealing with the site, DEP and EPA made it

Figure 2-2: Eastern Manufacturing Cooperation, Brewer, Maine

Google Maps

possible for Brewer to move along with planning for the site and complete the redevelopment quickly." (Hollander, pg. 102) Containers and left over mill debris were removed offsite to an appropriate disposal site, while the contaminated soil and groundwater was capped to keep contaminants from entering the Penobscot River. "The Maine DEP's aggressive attention to environmental contamination was an essential ingredient in the success of the project." (Hollander, pg. 102)

"In 2005, the City of Brewer was awarded a $350,000 EPA Brownfields Assessment grant to assist with assessment efforts conducted on the property." (EPA, Former Mill) In addition the City of Brewer was awarded $1 million for the Brownfields Revolving Loan Fund grant for city wide improvements on the many brownfields sites that exist. $550,000 of the EPA Brownfields Revolving Loan Fund was awarded to Cianbro for the remediation and reuse of the former mill site.

The City of Brewer first proposed an adaptive reuse for the property including store fronts, apartments, and office space of the existing mill buildings left onsite. The approved reuse of the site was a modular construction facility where components are fabricated and shipped to another site. The deep waters of the Penobscot River, experienced work force and the abandoned mill facilities proved to be a great match for Cianbro. With the promise of 500 well-paying jobs, Cianbro proved to be what the City of Brewer was looking for.

This particular brownfields site was a success because of job creation, no further river contamination, and the development of a local brownfield remediation organization. The South Brewer Redevelopment LLC (SBR) is currently going through the brownfield redevelopment process again with the HoltraChem Plant, a chemical facility with dangerous contamination found in the soils and groundwater. The SBR has the experience needed to complete the new project due

www.panoramio.com

to the Eastern Manufacturing Facility project.

Maine Street Station, Brunswick, Maine

Maine Street Station in Brunswick, Maine was developed as a rail yard in the late 1800s. In the early 1980s developers purchased the property for redevelopment until the discovery of coal ash while under construction. (Land and Community, 2008) Soon after the contaminant discovery the development company went bankrupt and the city placed leins on the property preventing redevelopment. The property sat idle for 20 years until the community purchased the property in 1998.

The site is contaminated with polycyclic aromatic hydrocarbons and coal ash. These are two chemicals typically found at abandoned rail yards. A capping strategy will be employed to remediate polycyclic aromatic hydrocarbons while the coal ash will actually be incorporated in the asphalt capping material. The Maine Street Station Steering Committee has been formed to develop a new master plan for the site and to remediate onsite contaminants.

The funding for this site includes many grants form various state and federal agencies amounting to over $2 million. The more notable grants are the EPA Brownfields Assessment and Cleanup Grants, Maine Department of Transportation, and the Economic Development Committee. The site costs were reduced dramatically by using the coal ash in the capping material instead of excavating the material and disposing of it offsite.

"The redevelopment will include office space, apartments, commercial and retail space and parks and is expected to generate jobs, revive the downtown area and provide easy access to various transit options." (Land and Community, 2008) A new Amtrak station with parking is part of the reuse strategy as well. The entire redevelopment site is a total of 40 acres and is located near the local Bowdoin College. The site master plan is designed to make a connection between downtown Brunswick and the college campus. (Land and Community, 2008)

Maine Street Station was a successful brownfield remediation and reuse. The Brunswick Amtrak station is operational which serves the Down-easter to Boston and daily commutes to Portland. Commercial, retail, and residential

Figure 2-3: Maine Street Station, Brunswick, Maine Aerial

Google Maps

land uses are all operational across the entire 40 acre site and works to bridge the gap between downtown and Bowdoin College.

en.wikipedia.org


yosemite.epa.gov

Chapter 3

Methodology

Not all brownfields sites are the same and rarely require the exact same procedure as another site with the same contaminants. Many variables in site conditions, regulations, contaminants, remediation, and reuse options make brownfield strategies site specific in each category. There are “several different technologies that exist for addressing the same compounds or class of compounds, and each technology will present unique advantages, disadvantages and footprints at a specific site.” (EPA, Brownfields) The same is true for community and economic development options. This chapter is a toolbox in which site professionals can assess a particular site and choose the best fitting options for certain characteristics for each stage in the process.

3.1: Brownfields Laws and Regulations

National level brownfield regulation is a broad framework for states to follow in order to create more specific programs for environmental protection. The federal Comprehensive Environmental Response, Compensation and Liability Act determines contamination responsibility and gives states the tools needed to enforce cleanup. State regulation of brownfields is stricter than federal regulations. This section describes available programs found in Region 1, in particular the state of Maine that are available to promote and regulate brownfield remediation.

The Maine Department of Environmental Protection has published a regulatory procedure that must be followed for the Investigation and Clean-up of Hazardous Substance Sites in Maine. Each of the 4 phases has certain documentation to maintain record of remedial action at particular sites for both the DEP and EPA. (Maine.gov, Remediation Program)

1. Emergency Removal is the determination that hazardous substance levels have an imminent danger to public health or the environment.
2. Phase I Environmental Site Assessment is research of facility documents, documents on record of the DEP and EPA, and interviewing knowledgeable people about the potential of a release at the site.
3. Phase II Environmental Site Assessment summarizes and makes recommendations of the nature and extent of hazardous materials found on site through site samples and the Phase I investigation.
4. Remedial Investigation and Feasibility Study develops a site specific remedial action best suited to contamination levels and compounds found onsite. (Maine.gov, Remediation Program)

Programs such as the Municipal Brownfields Site Assessment Program, Municipal Brownfields Remedial Program Request for Assistance, and the Brownfield Revolving Loan Fund help with funding, investigation, and remedial resources. Available to brownfield sites in Maine are many grants, phasing documentation and program applications to assist in the cleanup of brownfields sites and to maintain a level of record for such projects. Most brownfields sites participate in such programs in addition to the Voluntary Response Action Program which has its own regulatory brownfield procedure. The Maine Department of Environmental Protection oversees development of programs and is responsible for licensing, enforcement and oversight of various land development activities.

3.2: Remediation Strategies

Brownfield remediation is the process "of reversing or stopping environmental damage." (De Sousa, 2003) There are many different available technologies that are chosen for particular site conditions, cost, and impact to the site. The following describes the phasing of remediation process and describes technologies available for potential use at the project site.

Brownfield assessment and remediation has a strategic process of five individual phases as described by Hollander. This breakdown helps provide a step by step process in which site redevelopment is achieved. These five phases of brownfield remediation have proven effective for the remediation of brownfield sites.

1. Initial site investigation which includes site history and interviews to index former manufacturing processes and site activities to target the extent of contamination.
2. Comprehensive Site Assessment tests site samples to find actual levels of contamination and to characterize risk.
3. Identification, Evaluation, and Selection of Comprehensive Remedial Section Alternatives is the selection process of remediation strategies best suited for the contamination detected on-site.
4. Implementation of Selected Remedial Action Alternative.
5. Operation, Maintenance, and/or Monitoring of Comprehensive Response Actions is the ongoing remediation practice onsite and the continued monitoring of contamination levels. (Hollander, 2010)

The following remediation strategies are used to treat Volatile Organic Compounds (VOCs), the confirmed contaminant found at the project site. They are organic chemicals with a high vapor pressure at room temperature and VOCs generally are found in products such as fuels, petroleum distillates, organic solvents and similar consumer products and their manufacturing. "VOCs have direct adverse effects on human health, and many have been classified as toxic and carcinogenic." (Hollander, pg. 28) There are many other remediation technologies that deal with different contaminants

typically found on brownfields sites not mentioned here.

Air Sparging (ETT) is a technology achievable by injecting air into the groundwater which vaporizes volatile or semi-volatile organic compounds. The vapor rises to the unsaturated soil where a Soil Vapor Extraction process is usually incorporated to extract the vapor-phase contamination. This process requires a large site presence with bulky equipment usually requiring a protective structure. "Air Sparging is best suited to situations where removal of a maximum quantity of pollutants from groundwater can be made." (EPA, Green Remediation; Hollander, 2010)

Bioremediation (IATT) is a process which uses microbes injected into the ground to breakdown organic compounds for energy and growth, turning contamination to relatively harmless substances such as carbon dioxide, water, and fatty acids. These microbes are the same used in the treatment of wastewater treatment facilities. This technology could be used in a train of remediation strategies or as a polishing treatment. "Bioremediation can be used on a variety of organic compounds and are a non-intrusive sustainable method of site cleanup. However, the technology needs time to work and may not be appropriate from brownfields where immediate remedial action is required." (EPA, Green Remediation; Hollander, 2010)

Excavation (ETT) removes the contaminated soils from the site and is disposed in an approved landfill. This technology is invasive and uses lots of energy to accomplish. It is used when onsite treatment strategies become too expensive for the large concentrations of contamination. (EPA, Green Remediation; Hollander, 2010)

Flushing is a remediation technology that injects water to raise the groundwater into the contaminated soil zone. This process flushes the groundwater and soil contamination to a point of extraction or pump and treat down the remediation train. (EPA, Green Remediation)

Multi-Phase Extraction typically lowers the water table around the well, creating a new zone of exposed soil contamination which is then accessible for vapor extraction.

The contamination is then separated from groundwater at the surface. (EPA, Green Remediation)

Permeable Reactive Barrier also referred to passive treatment walls, is a wall of permeable material, similar to a large filter, installed perpendicular to the flow of groundwater. The contamination plume is stopped at the wall by using treatment agents which is then degraded or retained in concentrated form at the barrier. The wall material has to be replaced periodically and the concentrated contamination treated offsite. (EPA, Green Remediation)

Pump and Treat (ETT) systems pump the groundwater from several wells onsite to the surface where it is treated and then returned to the ground. The contamination treatment can consist of any of the following, “absorption, air stripping, bioremediation, chemical treatment, filtration, ion exchange, metal precipitation and membrane filtration” (EPA, Green Remediation)

Soil Vapor Extraction is a process used to treat soil contamination by creating a vacuum which introduces air flow through the soil. This is used to remove volatile and semi-volatile organic contaminants. Soil Vapor Extraction is often used in combination with other remediation strategies that turn contamination into vapor. (EPA, Green Remediation)

Ultraviolet Light works in conjunction with hydrogen peroxide or ozone as oxidizing agents. Contaminated groundwater is pumped to the surface where the compounds are stabilized through the oxidation process initiated by the ultraviolet light. (EPA, Green Remediation)

Phytoremediation (EATT) is the use of plants and natural processes to remediate contaminated groundwater and soils. The process of phytoremediation utilizes a range of plant-based mechanisms such as enhanced rhizosphere biodegradation, phytoextraction, phytodegradation and other natural processes to remove, degrade, or contain contaminants. (EPA, Green Remediation; Hollander, 2010) This technology is most useful in combination with some other primary remediation strategy and can be used simply

in a polishing stage of treatment. This is an attractive option for remediation because of its cost effectiveness. Phytoremediation is a useful remediation strategy to enhance the landscape of a brownfield, demonstrate remediation to the community, and use it as part of the future planning of the site as listed in detail by Sleegers;

1. “Re-creation of systematic connectivity - from isolation to network in a flexible framework that structures a multi – layered urban infrastructure.
2. Visible transformation of toxics and contaminants as a sensual experience through the dynamic media of the landscape. Staging of phytoremediation as landscape typologies.
3. Landscapes to support environmental education and interpretation.
4. Remediation as a tool to build new districts and neighborhoods on former brownfields and a source for economic growth and revitalization.
5. Integration of micro scale with urban and regional scale as a multi-scale approach.
6. Decentralized, local, on-site strategies.
7. Interdisciplinary collaboration between scientists, designers, and planners” (Sleegers, 2010)

The final stage of brownfield remediation is monitoring the progress of site cleanup. This process is completed by an independent testing company along with confirmation analysis completed by state agencies. This process remains in place until the target goal of contamination concentration is reached with annual reports filed with the Department of Environmental Protection. Monitoring helps determine efficiency of the equipment being used as well as making sure there are no further environmental impacts from contamination.

3.3: Reuse Strategies

There are infinite ways to design a brownfield site, but the following are descriptions of the basic planning categories for a remediated site. Each has their advantages and disadvantages based on site characteristics. Town zoning and codes will also affect the implementation possibility for these land use categories.

Housing is an opportunity for reuse which satisfies the needs of developers with locations typically close to urban centers, transportation links, and often river corridors, lakefronts, and open space. This reuse strategy is particularly attractive in former manufacturing areas that happen to have structurally sound mill buildings and infrastructure as brownfields that can easily be transformed into apartments or condominium housing units. Housing is the most limited of the reuse options due to contaminant residue, subject to Activity Use Limitation covenants and public fear of living on or near previously harmful contaminated lands. (Hollander, pg. 52)

Commercial and Retail land uses "becomes possible when a larger brownfield project is broken down into design phases over time." (Hollander pg. 53) This process allows certain areas of the site to be made available to certain land uses before the completion of remediation. Many developable brownfields are often located along major transportation routes, have already been zoned for commercial land use, and within walking distances of major urban areas. (Hollander, pg. 53)

Light Industrial is a reuse strategy possible after brownfield cleanup has completed or integrated into adaptive reuse which merges new construction with former existing built forms. Light industrial typically is more regulated then heavy industrial which reduces the risk of further contamination. Again the advantage of previous zoning and access to major transportation connections help consideration for this reuse option. (Hollander, pg. 53)

Recreation and Open Space, or the greening of brownfields, utilizes contaminated sites for community recreational events

and activities. The scale of this form of reuse is versatile and can range from entire greenways to small pocket parks. (Hollander, pg. 54) With recreation and open space

"Landscape Architects tend to focus on the aesthetic and environmental benefits that green space oriented redevelopment can bestow on urban areas, such as improving environmental quality (e.g. air, water, and microclimates), restoring natural habitats, enhancing recreational opportunities, and enhancing urban appearance. In addition , recent environmentally focused research has been finding that urban greening improves the social well being of city residents in a variety of ways (e.g. in crime reduction, business enhancement, improved well being, stress reduction and so on.) (De Sousa, 2003)

Interim Land Uses is the possibility of phasing in usage over time of a brownfields site while remediation is taking place. This land use option is a growth and evolving land use "where initial short-term cultural uses, for example, are replaced in time by light industrial or retail, which are replaced after ten years by permanent housing as dictated by economics and the marketplace." (Hollander, pg 55) A strategy like this requires lots of planning in the early stages but will allow site productivity in the early stages of development and allows communities to dictate its usefulness.

The Environmental Protection Agency has created the Greener Cleanup Environmental Footprint Assessments and Best Practices program to help designers and developers become environmentally conscious when attempting to reuse a brownfields site. This program introduces a list of principles to follow to utilize best practices of brownfield cleanup and reuse.

1) Minimize total energy use and maximize use of renewable energy while targeting minimal energy consumption, power cleanup with renewable resources and purchasing energy from a renewable source.
2) Minimize air pollutants and greenhouse gas emissions by minimizing generation and transport of airborne contaminants and dust, use cleaner fuels to power machinery in a more efficient manor, and sequester carbon onsite with soil amendments

and re-vegetation.

3) Minimize water use and impacts to water resources by capturing, reclaiming and storing water for reuse onsite, minimizing water demand for vegetation by planting native species, and employ best management practices for stormwater management.

4) Reduce, reuse, and recycle material and waste by consolidating virgin material use and using recycled material as an alternative, beneficially reuse waste materials, and segregate and reuse or recycle materials, products, and infrastructure.

5) Protect land and ecosystems by destroying or removing contaminant sources, minimize unnecessary soil and habitat disturbance or destruction and minimize noise and light pollution. (EPA, Principles for Greener Cleanup)

3.4: Site Planning

Once the right planning category and remediation technologies have been outlined for a particular site the next step is actual site planning. Each of these categories are important site analysis and design stages when developing a reuse strategy for a brownfields site.

Community Interaction is the first step of planning for a brownfield redevelopment project and arguably one of the most important for project success. Site and local history play a role in the reuse of a site, making “both knowledge and decision making, with local community input indispensable.” (Thompson, pg. 75) Reviewing local comprehensive planning documents, community initiatives, and understanding the needs and wants of the community help in the decision making process to create a successful redevelopment. Similar to community gardens, the psychology is the same, if people come together and create something of their own, a pride is instilled in the project and makes it a lasting statement of community involvement. (Thompson, pg. 75)

Connectivity and Location is important when considering a redevelopment strategy for a brownfields site. “A park or public space should be accessible to the neighborhoods that surround it, both visually and physically.” (Bengtson, pg. 22) Connection to other parks, parts of the community such as downtown, major water bodies, or part of a greenway network are all important considerations to account for. It will play a major role in the amount of use a particular strategy will receive based on public perception of the space. Industrial brownfields typically are surrounded by uninviting industrial areas making the need for signage, inviting gateways, and community connections vital to success.

Project Program needs must be carefully assessed and drive the design of a site for overall success. “The development of a successful public space should be done with some specific programming in mind, rather than attempting to fit the programming to the space afterwards.” (Bengtson, pg. 23) Programming items may include recreational facilities, parks and greenways, commercial use, residential units, or any combination of uses, again returning to the community research in the beginning will help consolidate a clear program for a particular area.

Constraints can range from environmental to topography and infrastructure to policy and regulatory constraints. Environmental situations could be instances of shoreland zoning, wetlands and endangered species, which should not only be thought of as a constraint but an opportunity. Steep slopes and difficult terrain should be analyzed in great detail to make the design accessible to visitors for a friendly experience. Specifically with brownfields sites, property liens, restrictions, and environmental regulation drive much of the remediation portion of design.

Immediate vs. long term impact on the environment and community are important aspects to any design. Industrial areas typically have dominating features such as highway overpasses, adjacent industrial buildings and overhead power utilities allowing for designs to incorporate contrasting powerful landscape elements. Along with the area most brownfields are located in, “the very process of remediation

creates large barren spaces, since large areas of topsoil often need to be removed or covered, eliminating any surviving mature trees." (Bengtson, pg. 24) Fast vs. slow growing trees structural elements in the landscape, and reuse strategy are important to consider for both short and long term.

Historic considerations for both site scale and regional scale are needed to transform a brownfields site. Historic downtowns, local architecture, and local background can influence the appearance of site structures as well as the design decision process. At the site scale it is important to focus on site history in order to identify site contaminants and provide valuable information for site restoration projects. In some cases industrial elements such as structures or parking lots can be reused in order to cut down on costs and to serve as a reminder to residents of the sites past. "It is only by integrating the new uses with the former components that the park can be successful" (Bengtson, pg. 25) when incorporating elements for the previous industrial site.

Special construction considerations must be adopted for the importance of human health especially when remediating contamination. Some contaminants found at brownfields sites can become airborne when agitated and can cause serious health problems. This type of care must also be considered when revitalization is required near water bodies and natural habitats so as not to disturb the already fragile condition they are in. Certain details must also be taken into consideration for the construction of a contaminated site such as engineered fill in areas of removal, location of design elements in relation to contaminated zone, and the use of remediation equipment or technologies while phasing in site uses.

Chapter 4

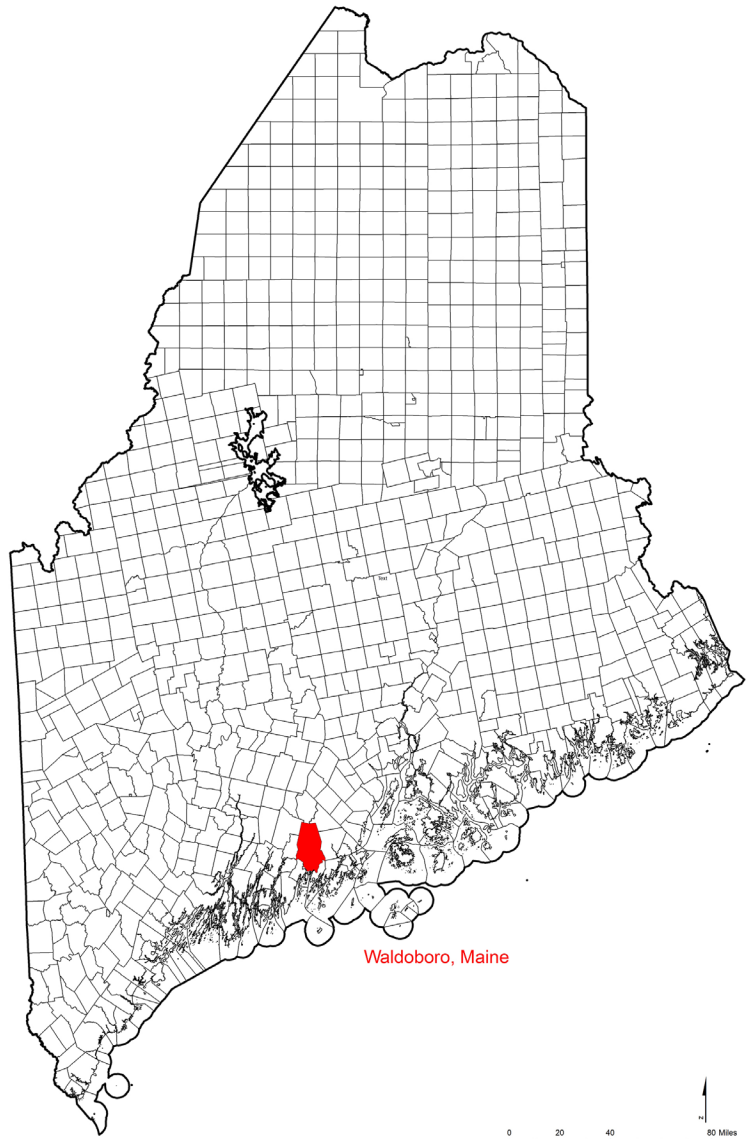
Site Reuse & Planning

The following chapter will gather available data in order to perform an accurate site analysis, gather information on the goals and objectives of the town of Waldoboro, and develop several landuse concepts for the Osram Sylvania Site. With all this information a Master Plan can then be created incorporating the goals and objectives of the community, creating a usable landscape, and repurposing a blighted property.

4.1: Town of Waldoboro

Waldoboro, Maine, Figure 4-1 and 4-2, the location of the project site, has a population of 5,075 people (2010 Census) and has the largest population in Lincoln County. The Town of Waldoboro was settled in 1773 and prospered in the major ship building industry of the time. (Location Maps) In 2010 the planning board helped to organize a renewal of the town comprehensive plan created by Bruce Hyman Planning, Richardson & Associates landscape architects,

Figure 4-1 Locater Map



and Theodore & Theodore architects. Over the span of three months the Planning Board held community events to bring about involvement as to where residents saw the community in 20 years. This plan looked at economic development, historic preservation, and a regional recreation plan. This process of compiling the new comprehensive plan started by completing the Areas of Distinctive Character map. (Attached) This plan made a map outline of the important features of the town such as historic downtown, riverfront access, and preserved woodland and agricultural lands.

Several recent projects and initiatives have been published by the town with the help from its new Planning and Development Director, Willa Antczak. A new bike and pedestrian plan has been published as a way to help think about connectivity from Main Street to the schools, and to the new recreation parks built just over a year ago. Rethink, Reimagine Revitalize Waldoboro is a collaboration between professional planners, architects, landscape architects, and community members who put together a document answering the question, “What do you want Waldoboro to be like in twenty years?” The major topics that came from that question is a “desire for economic opportunity, a strong belief that the diversity of the town’s residents is among its greatest strengths, and a legacy of attachment to the land and to the water.” (Revitalize Waldoboro, pg. 1) This document guided many of the decisions made in the comprehensive plan including, gateway start up grants, downtown streetscape and façade improvements, and the river walk conceptual design. Resources for these projects include Maine Department of Transportation, Lincoln County Regional Planning Commission and the local Waldoboro Bicycle Pedestrian Committee contributed to the completion of town planning documents.

Waldoboro has strategies for economic development, recreational amenities, and criteria for preservation. However it does not seem any of the planning strategies published have been accomplished or in planning stages in the near future.

The town is having trouble compiling funding for all of these projects which makes it hard to get anything started. Another recent plan approved by the Select Board is the Downtown Master Plan. This plan aims to make the historic downtown more appealing to local businesses by providing tax incentives and improving buildings and infrastructure of downtown. This was put together with input from business owners, citizens, and adjacent property owners. "In early 2010 the Downtown Village Task Force provided recommendations for the Board of Selectmen on steps the town could take to improve the downtown village area. These recommendations included: downtown business development, signage campaign, developing pocket parks, building façade improvements, artists in the village, river walk, streetscape improvements and completing a Downtown Master Plan to expand on these recommendations" (Downtown Master Plan, 2011) Figure 4-3 is a product of these recommendations.

Figure 4-2 Waldoboro, Maine

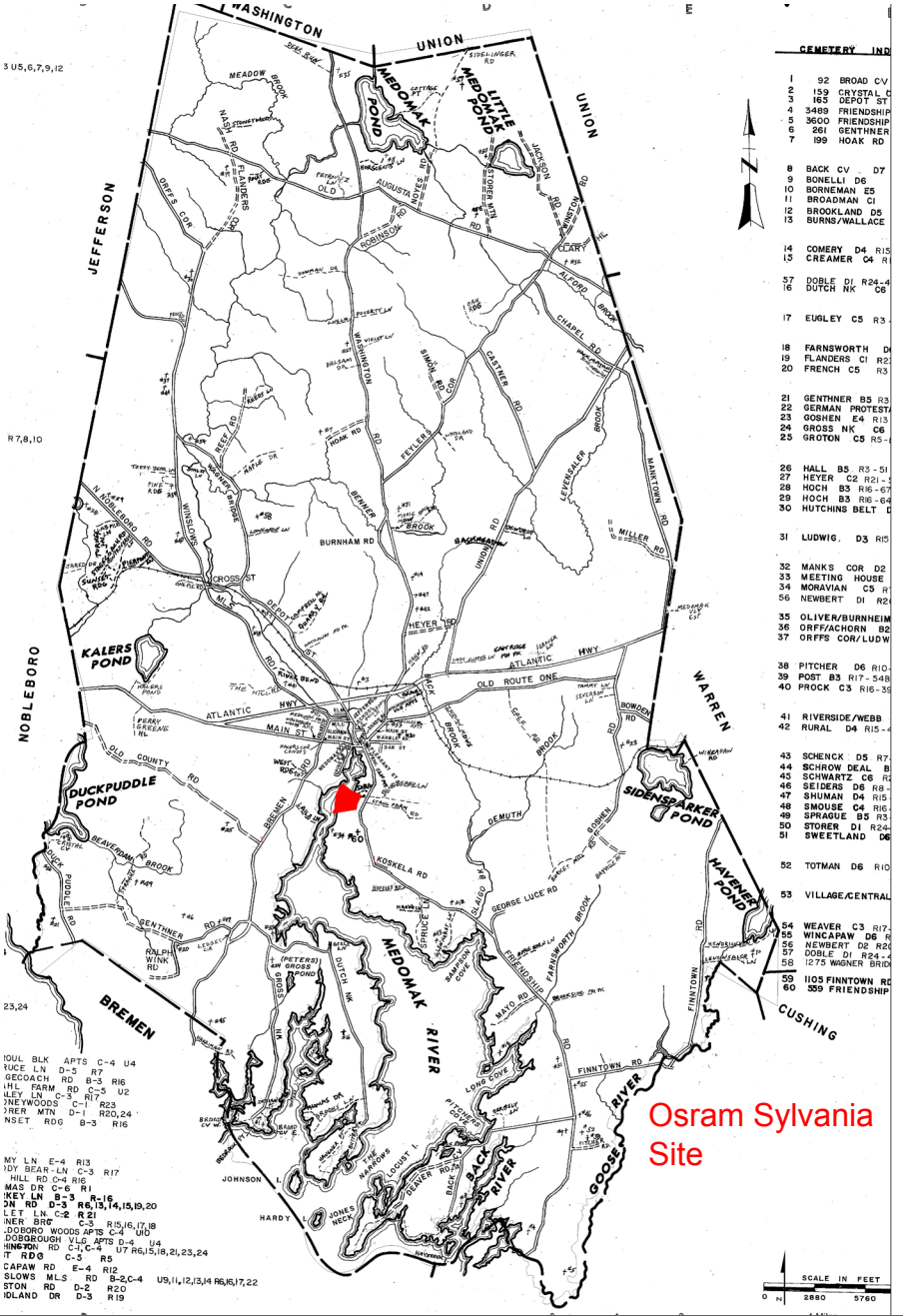
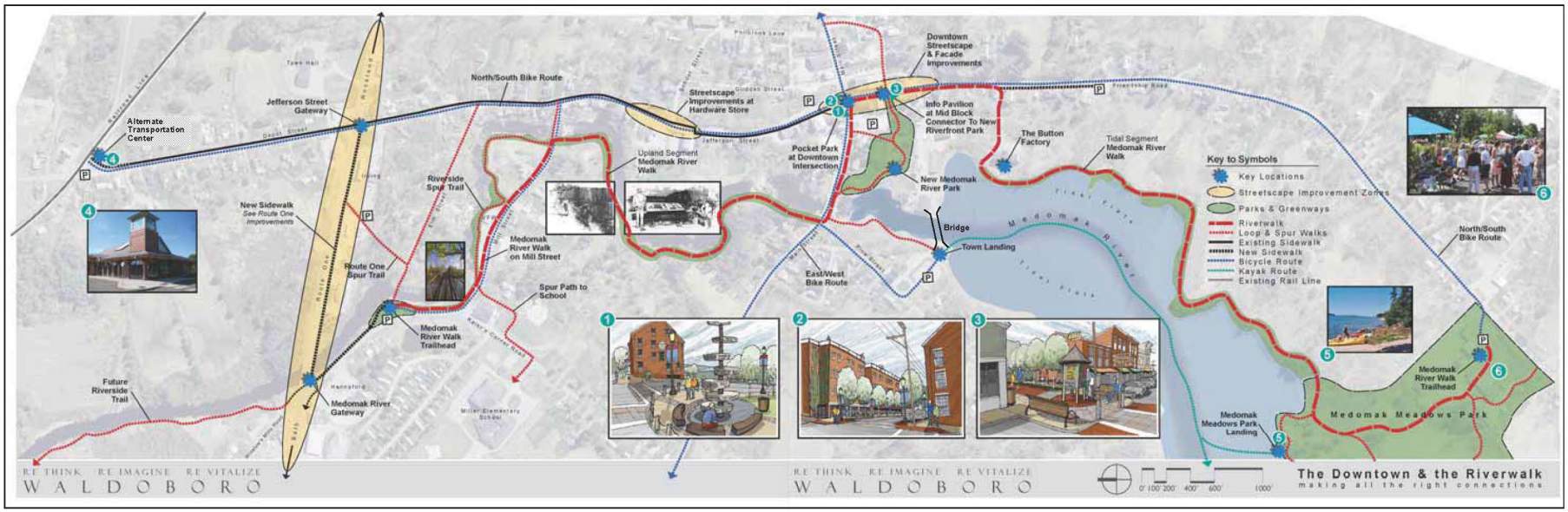
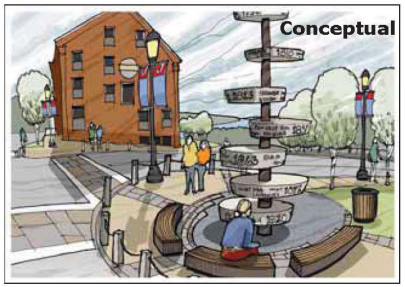


Figure 4-3 ReThink, ReImagine, ReVitalize Waldoboro

Creating a Village Destination

Final – Conceptual Only





NOTE: These images are conceptual in nature only and represent planning and design concepts. They are not recommendations but illustrate a palette of potential ideas for change for future consideration.

ReThink, ReImagine
ReVitalize Waldoboro

Bruce Hyman Planning
Planning for the Future You Want to Create
Richardson & Associates
Landscape Architects
Theodore + Theodore
Architects

9

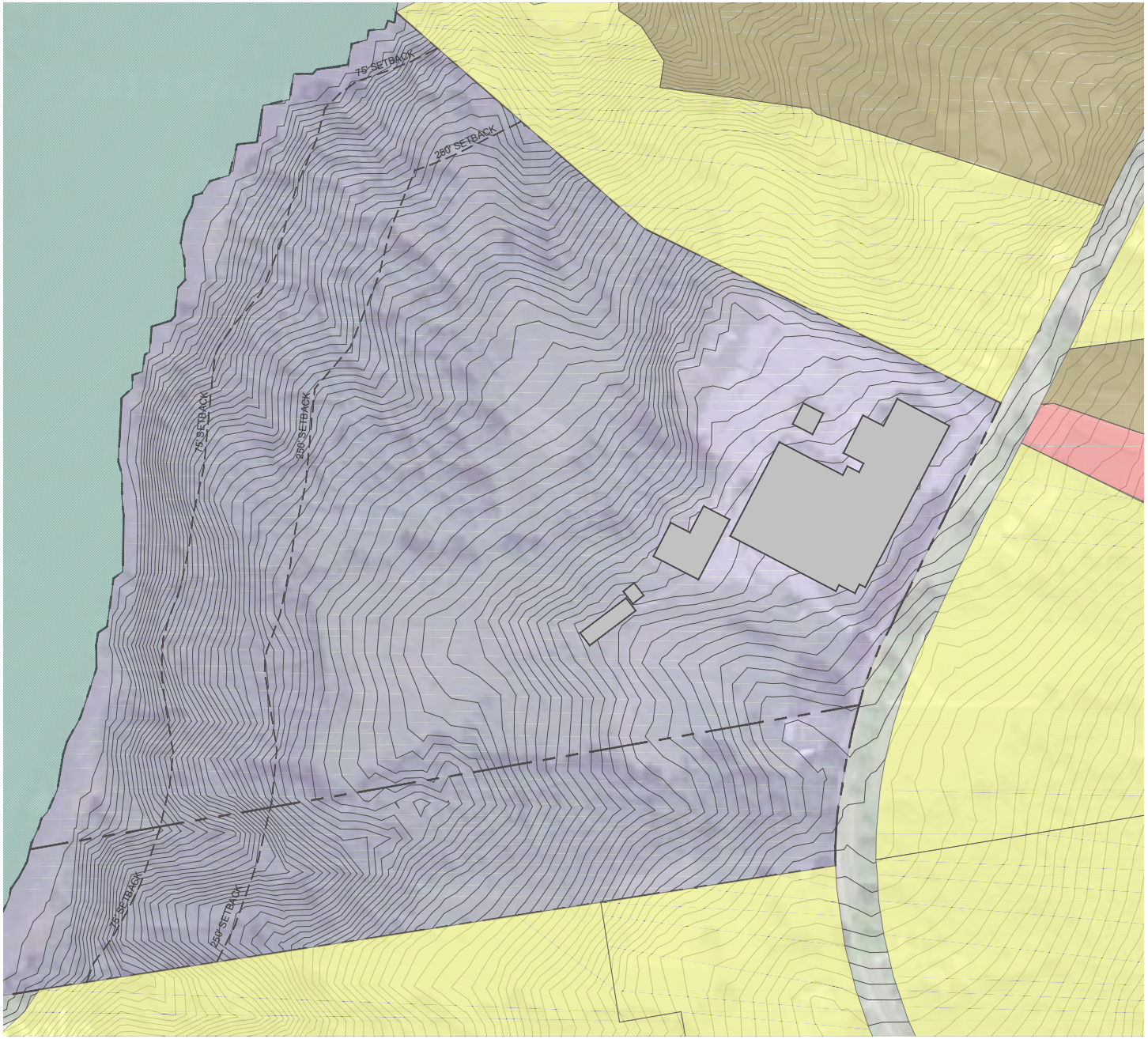
4.2: Site Analysis

The site analysis for this project is a collection of data to communicate all of the site detail with the use of maps, diagrams, and photographs. Data has been collected from sources such as Maine GIS, Waldoboro.org, Waldoboro Town Planner Wila Antzek, Google Maps and Terrain and several site visits. The site visits were used to obtain photographs, understand the remediation process, and get an overall sense of how the site may function in the future. The site analysis elements will be compiled into a comprehensive map in order to illustrate some of the more important factors for complete understanding of the site. Analysis and dissecting the site in this manor will help determine buildable sites, areas for parking, water access, preservation areas, brownfield remediation, areas of concern and other design elements for use in the conceptual phase and into the master planning phase. This information will be compiled into a site assessment where opportunities and constraints of the site will help to inform design considerations for several different landuse types.

The property which contained the former Osram Sylvania factory is a 39 acre site. Osram Sylvania also owns the parcel of land adjacent, to the South of the factory parcel which is an additional 9.2 acres, the property boundaries of which can be seen in Figure 4-5. The smaller parcel has an old dilapidated two-story colonial style house on the land. This house looks as though it hasn't been lived in or cared for in over a decade. There is little to no information about this house and parcel of land. On the larger 39 acre site there is approximately 1,570 ft. of waterfront land where the smaller site adds an additional 300 ft. With the shore frontage land comes Shoreland Zoning regulations and limits what could be done with the land and vegetation adjacent to Medomak River. There are a few areas where water access can be taken advantage of and will be explored in greater detail in the conceptual stage. Water access on this land largely is constrained by the steep slopes that meet the river's edge and dense hardwood forest which is restricted by Shoreland Zoning.

The Osram Sylvania site does have lots of tidal shoreland property which falls under the regulations of Maine's Shoreland Zoning. Shoreland areas are considered in this

Figure 4-4 Landuse Map

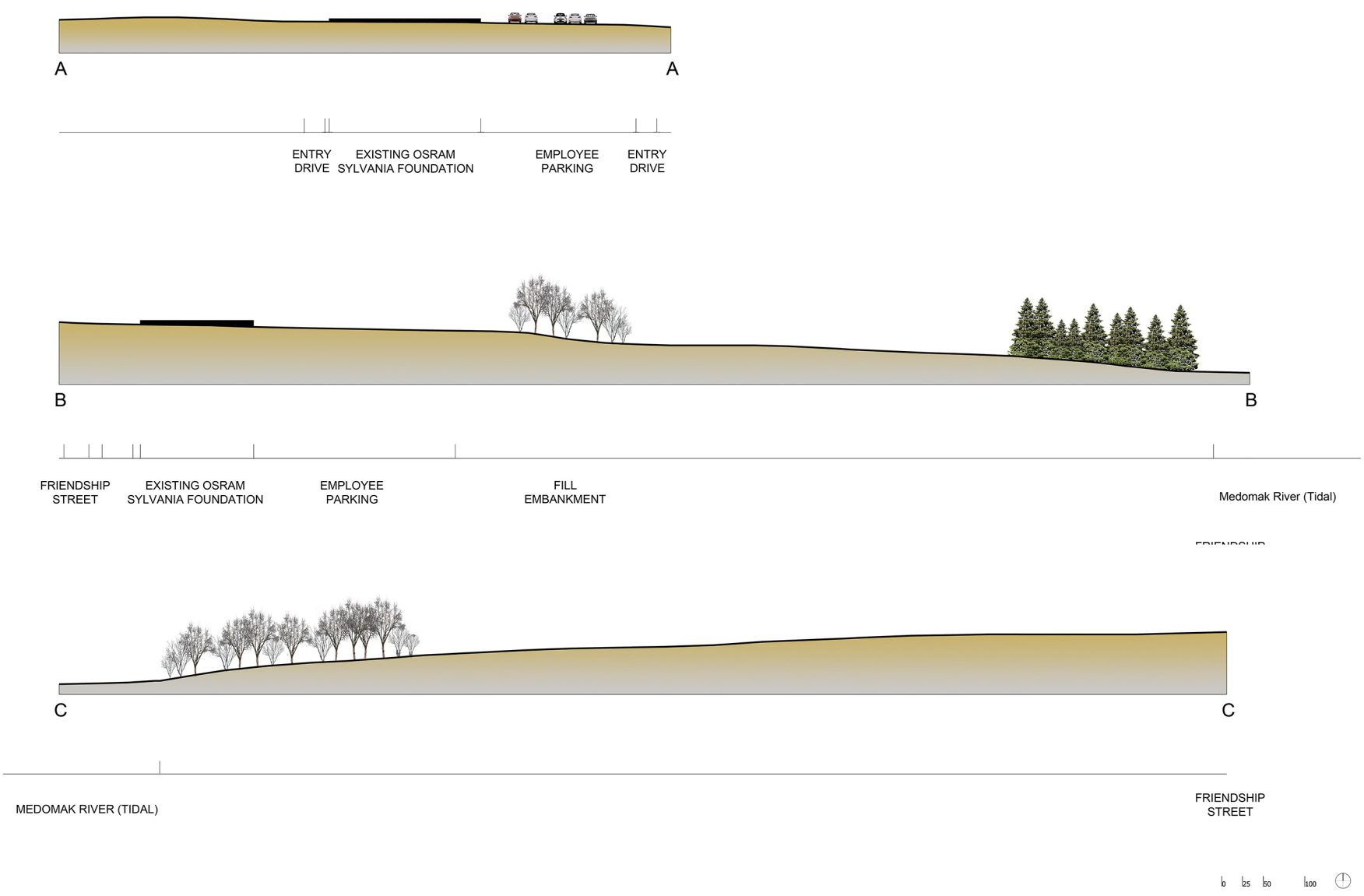


- Single Family Residential
- Multi-Family Residential
- Commercial
- Rural Village Business District I

0 40 80 160

Figure 4-5 Site Section Cuts

Figure 4-6 Existing Site Sections



case “all land within 250 feet of the high water line of any pond over 10 acres, any river that drains at least 25 square miles, and all tidal waters and saltwater marshes.” (MDEP, Shoreland Zoning) These regulations include setbacks, limits vegetation removal, and enforces erosion control measures to protect natural water systems. The property within 75’ of the Medomak River on this site is subject to the following regulations:

- On all other water bodies the buffer zone is 75 feet and clearing is limited to 40% of volume in a 10 year period and no cleared openings. Also within these buffer zones:
- No opening within the forest canopy can exceed 250 square feet. A winding footpath is allowed, its width depending on the body of water.
- Selective cutting is allowed according to an established rating system.
- No new permanent structure is to be built within 250’ of the Mean High Water (MDEP, Shoreland Zoning)

The site terrain varies greatly between Medomak River and up to Friendship Street. Across the combined site there is approximately 139 ft. of grade change from the high point located at the Southeast corner of the property down to Medomak River which has an assumed elevation of 0.0 ft. at Mean Low Water. The Slope Map Figure 4-9 shows the changes in slope across the site. Also, the slope changes can be seen in the existing site sections Figure 4-6. The slope map diagram illustrates the types of topography that exists on-site. In general terms, the site is split into two flat terraces ranging in slope from 0-5% separated by areas of steep slope in some cases in excess of 15%. In the Northeast corner of the site, where the remaining foundations are found, is the start of the first terrace with slopes under 5%. The upper terrace stretches across the drainage swale in the middle of the site to a flat open meadow area. Because of all the fill used to create a flat surface for parking and the building complex, a steep 15 foot drop in elevation occurs at slopes in excess of 15% at the west end of the terrace. The bottom terrace is mostly open meadow area that reaches all the way across the property. The reason it is an open field is probably because of the less steep slopes and that part of the site could actually be farmed and hayed. To the west of the bottom terrace is very steep slopes reaching down to meet Medomak River. This

area is old hardwood forest which has great character and would make a great walking path when walking parallel with the slope. The one area of possible water access would be in the Northwest corner of the property which still could pose challenges in terms of parking and getting boats to the water.

Figure 4-7 Existing Foundation Areas

The Osram Sylvania site is one of the only industrial zoned properties located on the tidal portion of the Medomak River. Most other landuse types to the South, the direction of the ocean is private single-family residential and preserved open space and forest conservation. Directly adjacent to the site are a few different landuse types to note. Across the street is designated business use and is currently a bowling alley and bar. To the north of that is multi-family residential in the form of a mobile home community consisting of 32 residences. Most other landuse types adjacent to the site are zoned as single-family residential. The project site is classified as "Rural Village – Business District I" which is defined as, "the intent of the Rural Village Business District is to encourage small scale, residentially compatible business activities in Waldoboro's historic rural crossroad neighborhoods." (Waldoboro Land Use Ordinance) This designation allows for more lot coverage

(50%), smaller setbacks (15ft.), and allows for a smaller lot size (5,000sq. ft. – 80,000sq. ft.) then residential and other landuses. Rural Village Business District allows for uses such as open space subdivisions, farm, garden commercial, recreational facility, restaurant, retail sales, and wholesale business all with the approval of the planning board.

The existing conditions of open space compared to forested land is around half and half. 56% of the site is forested and is mostly located on the steeper slopes of the site whereas open space and impervious surface make up the remaining 44%. The forested areas consist of old hardwood forest along the steep slopes of the shore which include Oak, Maple, Ash, Beech and some Birch. The Eastern edges of the hardwood forest are mostly successional species taking back the open unmaintained meadow areas and include species like White Pine, Poplar, Grey Birch, and Sumac. Along Friendship Street is a row of Norway Maple 'Crimson King' and other miscellaneous trees and shrubs once part of Sylvanias landscape. The open meadow areas of the site are slowly starting to succumb to successional plants because they have not been cared for in nearly a decade but still mostly open space. 10% of the entire site is impervious surface, a large part of which is parking area for the 200 people that worked there and has little to no vegetation.

The existing site sections give a good sense of how the topography at the site generally has a downward slope from Friendship Street down to the river in an East-West direction. Section A-A' is cut through the site in a Southwest-Northeast direction (Figure 4-6) facing the river direction of the property. Section A shows the crowning unmaintained open meadow on the South side of the property, sloping down slightly to the developed industrial portion of the site. Section B-B' is cut in nearly an East-West direction from Friendship Street down to the river. This section shows a clean distinction between the industrial usage and the native portion of the site with the steep slope separating the two. The steep slope is the edge of the fill area built up for a flat parking area of up to 200 employees. The last existing site section, Section C-C' is cut in the native portion of the site in order to see the character of the site without alteration of industrial usage and is cut in the West-East direction. Section C shows a gradual slope up from the river to Friendship Street with a slightly steeper slope near

Figure 4-8 Site Land Cover

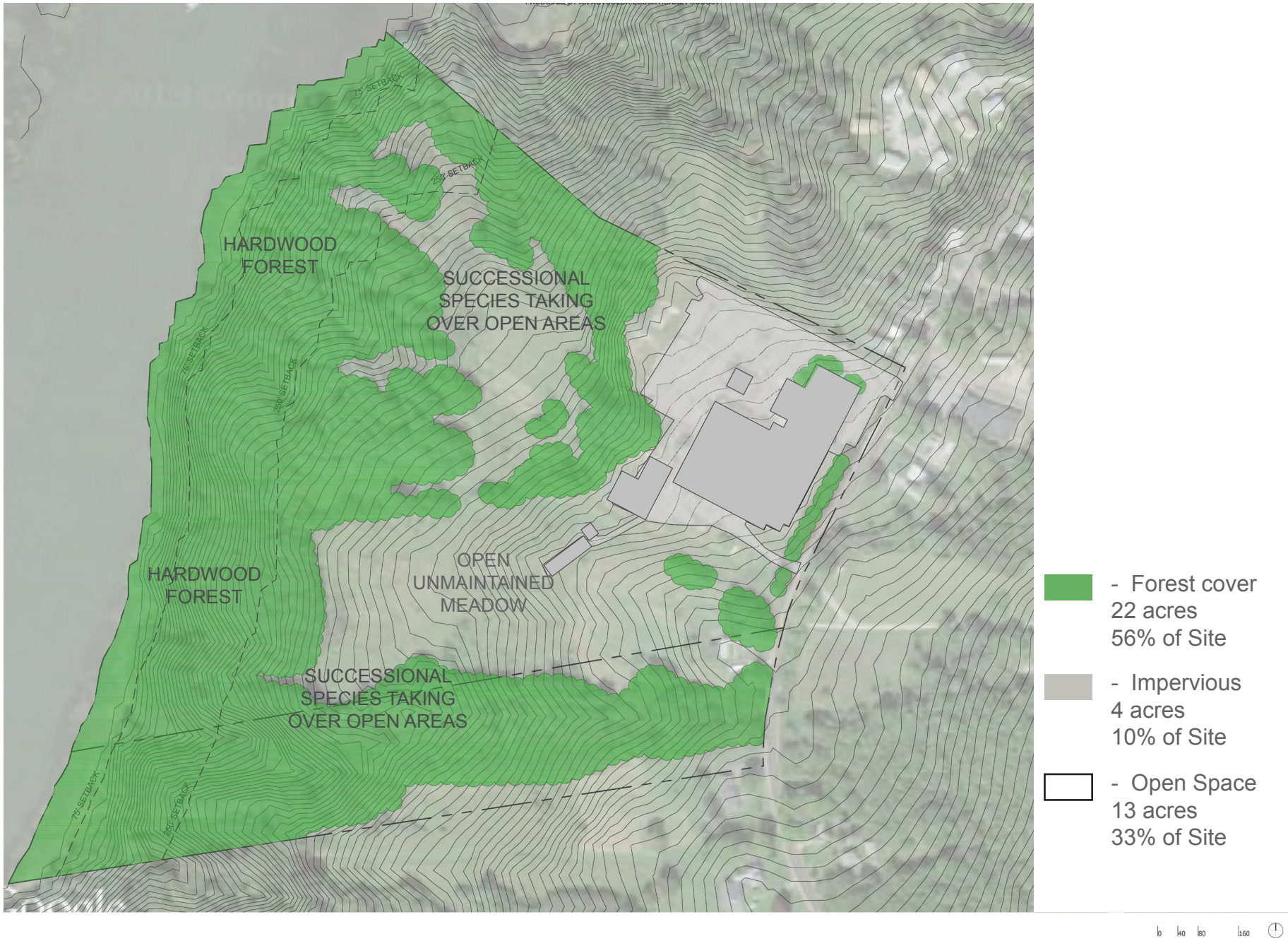
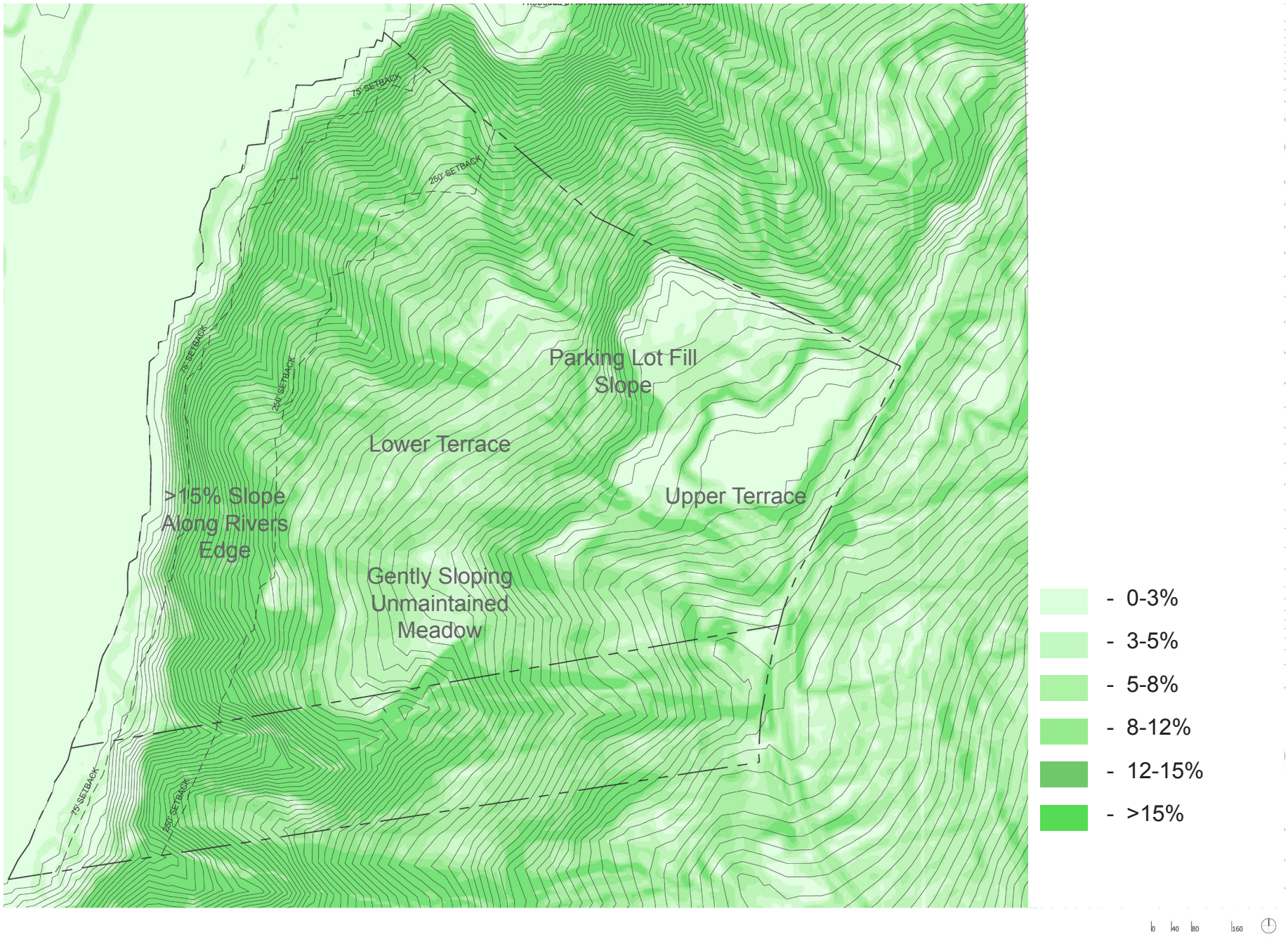


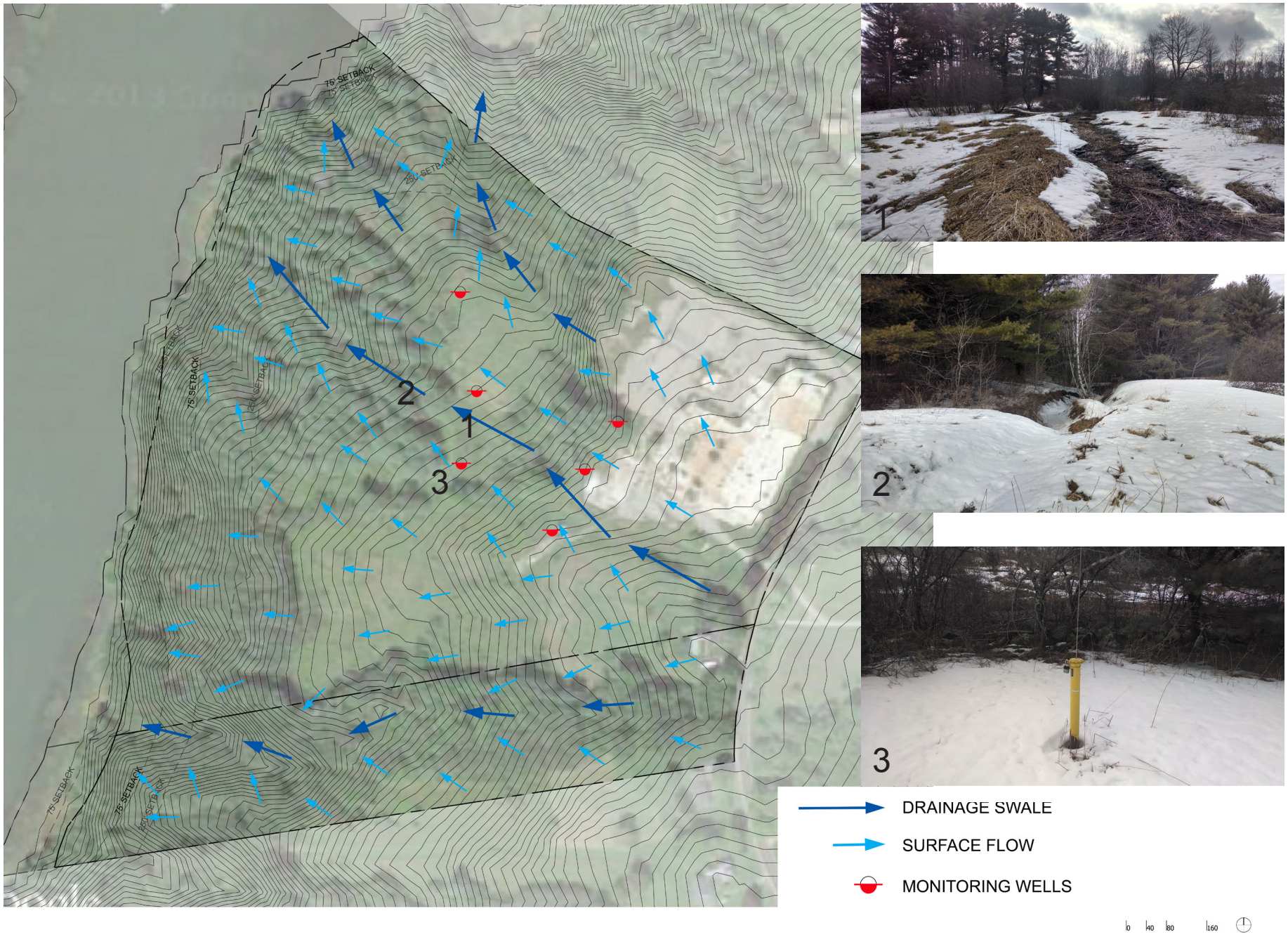
Figure 4-9 Slope Map



the water's edge. It also depicts the forested buffer that exists before reaching the unmaintained meadow which occupies a large portion of the site.

Several of the former industrial complex foundations still exist on-site due to the risk of agitating the assumed contamination that lies beneath. This is an assumption made by the Maine DEP because of the inability to target the exact location of the soil contamination that is migrating into the groundwater. These foundations were scheduled to be removed in the fall of 2013 but never where due to the lack of funding for this stage of site remediation which can become costly. This is a common theme in voluntary brownfield site contamination cleanup where stages of remediation get delayed due to lack of funding and resources. Figure 4-7 shows the location and areas of the remaining foundation structures. The foundations still on site are first, the large main building which is approximately 58,000 sq. ft. is at elevation 116.0 ft. Second, is an old storage building that handled incoming and outgoing shipping of materials is located to the West of the main building, is approximately 6,700 sq. ft. in size and is at elevation 109.0 ft. The last existing foundation

Figure 4-10 Site Drainage & Monitoring



left on-site is what used to be some sort of cold storage area which lies directly adjacent to the remediation equipment, to the Southwest of the main building with an area of 2,300 sq. ft. is at an elevation of 112.0'. All of these foundations will have to be removed to get at the source of the site's contamination, which in turn will stop the contamination of the groundwater on-site. The foundations are unusable but their infrastructure will still be available. Town water and sewer is located on-site as well as overhead electricity.

Site drainage (Figure 4-10) is a diagram describing the basic flow patterns of water across the site. Largely the site is surface flow in the East-West direction down to Medomak River. There is one major drainage swale in the middle of the site which collects a large portion of the surface flow. There are also several minor drainage swales on-site that form near the bottom section of the site before entering the river. With this pattern of water migration, contamination from the site entering the river is a real possibility. In order to monitor the migration of the contamination plume several monitoring wells are in place and is photographed in Image 3 of Figure 4-10. The process of monitoring the contamination levels in the groundwater is important to make sure it does not migrate and cause further environmental damage, which could be great if it were to reach the river.

Aside from the monitoring wells, other remediation equipment is in place on-site to treat groundwater contaminated with Volatile Organic Compounds. This equipment is constantly pumping contaminated groundwater from wells located downhill to the West of the main building foundation where the contamination is believed to originate. The contaminated groundwater goes through a process known as Air Stripping. This is a process in which the water is turned into a mist, turning the Volatile Organic Compounds into a gas. The gaseous material is then captured with carbon filters which are then disposed of in approved hazardous waste landfill sites. Once the pumped groundwater goes through this process, it is cleaned of most contaminants and meets the EPA's Clean Water acceptable levels. The water is then released to the major drainage swale seen on Figure 4-10 photos 1 & 2, and eventually ends up back in the Medomak River.

The photo tour section is a compilation of photographs

taken on several different site visits. For each photograph a reference map is provided with arrows forming the direction in which the image was taken as well as a description about what is depicted. Views, site elements, landscape and images of the river are all included in this section of the project.

The entrance to the site shows overgrown landscaping and a small portion of the existing building foundation that lies behind it. The entry drive on the right side of the image leads to the employee parking lot located behind the former building. Friendship Street is also visible on the left side of the image traveling in the Southwest direction.

The main building foundation is an estimated 58,000 sq. ft. and is mostly what people see when driving by the site. Looking out across the foundation the West side of the Medomak River valley is in the distant views.

The above image is looking South along Friendship street and shows an allee and grass buffer between the street and the old factory site. Also seen in this picture are two fire hydrants and a sewer pumping station indicating town water and sewer infrastructure is available for the reuse planning.

Looking South across the former Sylvania foundation, building debris and crumbling asphalt is whats left of the former industrial complex. The foundation also remains due to the threat of agitating existing soil contamination.

Looking East, the secondary entrance to the site is slowly starting to succumb to succession with grasses growing up through the asphalt which is crumbling and no longer usable. The electricity poles in this photo power the remediation station just south of this photo.

The West side of the Medomak River Valley is visible from the upper part of the site. Views of the actual waterfront are not visible currently except from close distances.

This the larger of the two open areas of the site which is unmaintained with the edges slowly giving way to successional species such as White Pine, Birch, Poplar, and various vines and other pioneer vegetation. The forest area pictured acts as a riparian buffer to the Medomak River.

Through the dense forested area, views of the river only visible from close distances. This is the area where Richardson & Associates propose a river walk to the Medomak Meadows Park. This is the character of the shoreland area for the whole 39 acre site.

The Medomak River is located in a very rural part of Maine and has little opportunity for visibility from the community. By providing areas for hiking trails and recreational access to the river, the community will receive parts of the comprehensive plan they found were important to the growth of the town.

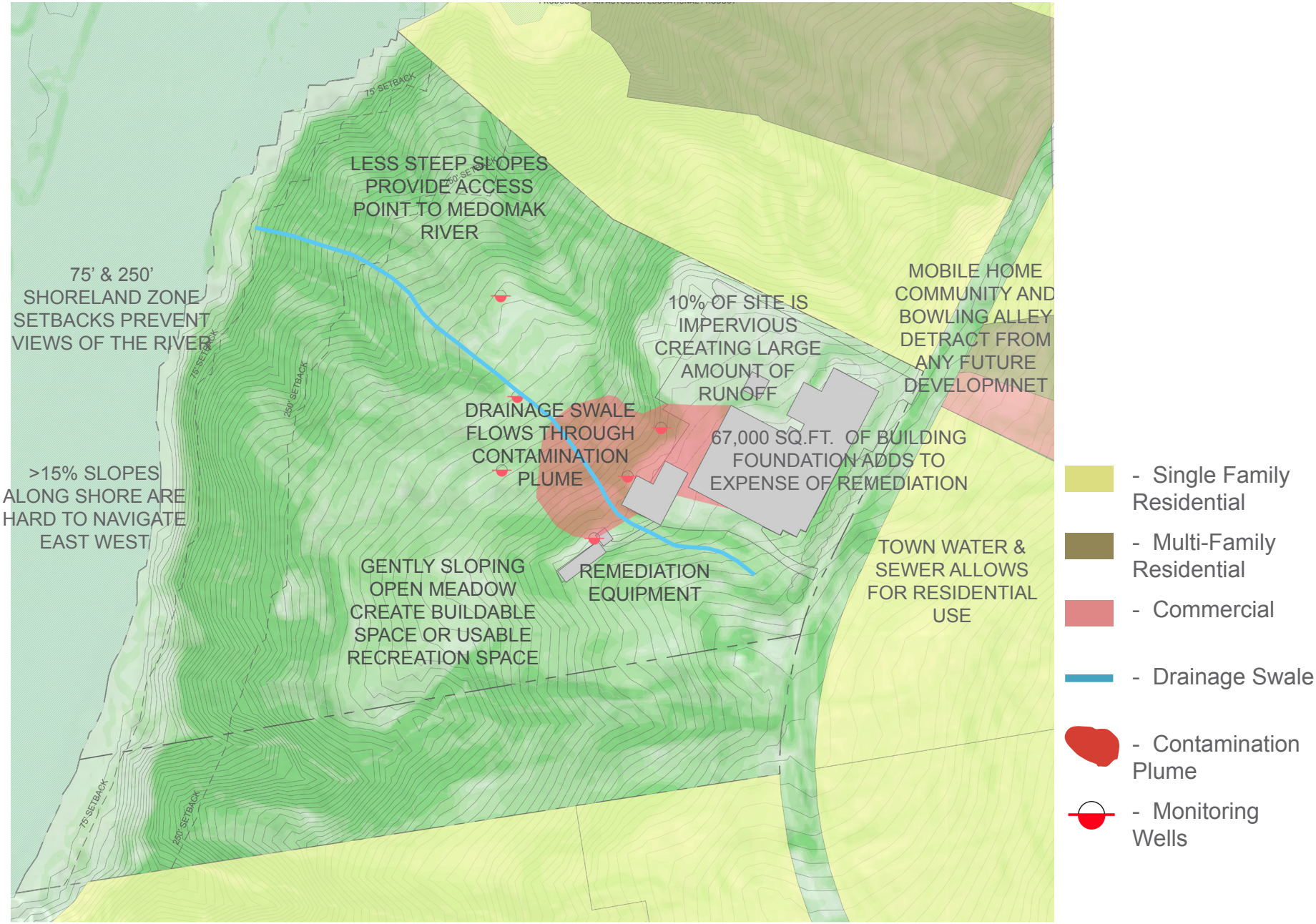
4.3: Site Assessment

The site assessment takes into consideration all of the elements discussed in the site analysis and determines what characteristics can be utilized as an opportunity and which are posed as constraints. Most of the time certain elements can be viewed as being both an opportunity and a constraint, a major example being, in general, a brownfield site. Brownfield sites pose constraints on development by way of cost, health concerns, building debris and other environmental concerns. The positive side of developing a brownfield site is the sustainable aspect of reusing a previously developed site, preserving greenfields, utilizing existing utility infrastructure, and in some cases reusing existing structures. Development of the Osram Sylvania brownfield site is a great way of expanding development close to a historic downtown area while preserving the rural character of the town by not developing greenfield sites.

The Osram Sylvania site in Waldoboro has many opportunities available to take advantage of for the landuse conceptual designs and the final master plan. The fact that the site is a brownfield will be viewed as an opportunity because of the reuse potential of a previously developed site allowing the rural character of the town to remain intact. Another major opportunity of this site in particular, is the presence of Maine DEP and EPA for the remediation of the contamination found on-site. With the remediation strategies already in place, there is now only a need to find the best reuse strategy available for the site and the community. The positive existing elements analyzed include town water and sewer on-site as well as electric, the open green spaces of unmaintained meadow, primary and secondary entrances off Friendship Street, possible access to Medomak River, 0.8 miles away from the historic downtown area, and the gentile topography of the two terraces. All of these elements are diagramed in Site Assessment Diagram Figure 4-11.

The project site, like most brownfield sites, is not all positive characteristics. The largest constraint on the site is the fact that Volatile Organic Compounds are present on-site and are not easily accessible. They are not easily accessible because the main source of contamination remains beneath the existing building foundations which poses the next major

Figure 4-11 Site Assessment Diagram



constraint. A combined 67,000 sq. ft. of covered foundation is a large amount of material that needs to be demolished and removed or repurposed. Whether this material needs to be hauled away or it can be reused, it is a substantial cost to an already withering cleanup budget. Other existing site elements that pose constraints on the reuse of this property include heavy forested buffer not allowing any water views from the site, steep slopes at the river's edge, open spaces being taken back by succession, and reduced site awareness then in other parts of the town.

The Site Assessment Map Figure 4-11 is a compilation of the important site characteristics to note. The major concern and main focus of this project is the groundwater contamination plume coming from the existing building foundations. The delineation of the plume is not exact but an educated general area taking into consideration the placement of monitoring wells, building foundations and existing remediation equipment. The sites major drainage swale seems to go through the middle of this plume down to the river creating the need for continuous remedial action. Also, factors to take into consideration are steep slopes along the waterfront area, Shoreland Zoning regulation setbacks of 75' and 250', 4 acres of impervious surface, and 67,000 sq. ft. of building foundation. The Site Assessment Map also illustrates the positives of two large areas of gently sloping meadow areas and large amount of tree coverage available for preservation. Finally, this map shows the adjoining landuse which mostly consists of single family residential, but shows one parcel of commercial directly across the street in the form of a bowling alley and bar.

When analyzing the land use classification of this site, an exercise was done in order to show the worst possible scenario of site redesign. Figure 4-12 shows how the site could look if a profit driven developer split the site into as many 2 acres parcels as possible. With the landuse in this scenario being residential, lot sizes and setbacks were considered as such. The red areas shown in Figure 4-12 are non-buildable areas due to shoreland zoning requirements of no new structures within 250 ft. of tidal waterways and also non-buildable slopes of greater than 15%. 15 buildable lots are possible if this layout were used, creating as many 2 acre lots as possible for profit driven development.

Figure 4-12 Maximum Housing Parcels

Figure 4-13 Maximum Commercial Areas

Figure 4-13 shows the same type of worst case scenario but in this case with commercial landuse. The image shown is the layout of a Walmart Suepercenter located in Bangor, Maine along with a cluster of small commercial businesses all with the appropriate parking requirements. In this scenario, approximately 200,000 sq. ft. of commercial space is available which requires a total of 410 parking spaces (parking requirements were used from Amherst, MA town regulations.) In total, if this scenario were to happen, 13.5 acres of the site would be covered in impervious material.

4.4: Landuse Concepts

The site analysis and assessment are essential parts to the design process because a complete understanding of the site helps aid in the decision making process. Before the final design and master plan can be completed several possibilities need to be considered in order to decide which will best suit the site, the community, and is best for the contamination found on-site. In the concept stage for this project different landuse types such as parks, recreation, and open space, commercial, and housing, have been designed in a conceptual way to analyze each element and figure out the best possible fit. From this approach, phasing can also be analyzed with the transition of different landuses through time if that is the best option for this particular site.

Parks, Recreation, and Open Space

Parks, recreation, and open space is a landuse concept which is driven by town planning documents. During the community discussions held for the creation of Rethink, Reimagine, Revitalize Waldoboro, one major component community representatives decided was necessary was a single facility for ball fields, tennis and basketball courts, hiking trails along the river, and a safe place for playground equipment. The Osram Sylvania site is in a perfect location where the downtown area is .8 miles away and the local elementary school also close by. This landuse concept would could use a large portion of the already developed area of the site while allowing remediation to continue as the site is being reused.

The opportunities with this concept is that a large number of the community representative needs and wants for the town can be created all on a single parcel of land. A parcel of land which promotes sustainable development by cleaning a contaminated previously developed site and preserving greenfield sites. The size and openness of the site allows for other uses such as a local farmers market, an events green, skating pond, and river access for kayaks and canoes on Medomak River. The skating pond is an opportunity to allow for community interaction with remediation by making the pond a polishing cleanup strategy. This type of strategy cleans the residual contamination that comes from the Air Stripper unit to levels nearly undetectable. Figure 4-14 shows how all the

Figure 4-14 Parks & Recreation

sites program elements can work together on the site.

Parks, Recreation, and Open Space Program Elements:

- Baseball / Softball fields
- Tennis / basketball courts
- Playground area – incorporating industrial elements
- Skating pond – Remediation element
- Water access for canoes and kayaks
- Events green with covered structure
- Trail system with loops for both hiking and biking
- Open space for famers market

The constraints that presented themselves for this concept mostly occurred after further town research and the site analysis. Within the last two years a recreational facility with a softball and baseball field was created adjacent to the local elementary school. This facility possess that land need to expand and accommodate all of the needs described in the town documents. Another constraint with this concept is Shoreland Zoning has strict regulations on removing vegetation and adding a permanent structure such as a boat ramp with out other more stringent permits and town planning board approval. Recreation is still a viable concept and could work well as an initial phase while contamination remediation continues. By removing the ball fields and tennis and basketball courts from the program, the remaining components could be located on-site in a way to allow for the removal of the foundations, soil cleanup and the continuation of groundwater cleanup. This would also provide a great opportunity to introduce the community to the cleanup process and see how the site progresses through time.

Commercial Landuse

The big idea behind adding commercial landuse to this site is centering business around all the small vendors and artists in the area. The commercial space is meant for local, handmade products that otherwise would sell out of people's homes. This space would create a center for customers to gather and create a greater visibility for small time business owners. This space is also meant to gather the local artists in the area and display their work to the public. The second floor of the facility could even serve as a studio space for the

Figure 4-15 Commercial Landuse

local artist community. By creating spaces for art display and sculpture gardens, this concept provides a great opportunity to gather more people and increase visibility for all the people involved.

Commercial Program Elements:

- 15,000 sq. ft. of commercial space (utilizing existing infrastructure)
- Second floor artist lofts
- Covered outdoor artist display area
- Sculpture / Art walk
- Local Seafood and Ice Cream
- Entertainment amphitheater with adjoining overflow green space
- Water seating along riverwalk

The major constraint hindering this concept is the contamination, existing foundations, and pavement. Program elements such as a commercial facility is impossible until the remediation has completed in order for new construction to occur within close proximity of site utilities. Another constraint is the public's perception of food located on a formally contaminated site. Having local seafood and ice cream is a need in the downtown area, but this particular site will have a negative perception well into the future about what happened on-site. Adding an area of commercial landuse to this part of town could be a great way to turn around the effects this brownfield had on the neighborhood. Turning this blighted property into a well visited, bustling hub of local goods could reverse the decline in property values, reduce crime, and improve the aesthetics of a picturesque landscape. The hindrance with this concept is the time to complete remediation, but could easily be part of a phasing plan and support local goods sometime in the future.

Residential

Residential is the third conceptual landuse to be analyzed for use at the project site. Opportunities for utilizing housing on this site is the number of housing lots that would be available over 39 acres. Some of which would be water view lots on the coast of Maine which has been a profitable trend in the last couple of decades. Another opportunity are the characteristics of the topography, the upper and lower terrace, allow for housing to be split into smaller sections creat-

Figure 4-16 Housing

ing the illusion of being more private.

Housing Program Elements:

- New England Village Layout
- Town green
- Water view lots
- Cluster development for conservation
- Residents trail system
- Playground area
- Designed with possible areas for phasing

Conceptually housing could be a great fit for the project site but there are a few constraints which could prevent it from ever becoming a reality. The first major constraint is actually in the deed for the property. There is a 20 year restriction on residential use after the completion date of remediation. This is in place because remediation cleans contaminants to acceptable levels, but still has a small concentration which needs time to be completely cleaned by plants. The next major constraint is that this concept is more profit driven then anything which can always pose a constraint on sustainable design. In reality, this site is still in private possession of Osram Sylvania who, by the end of remediation will have spent millions of dollars. If this is a viable option for them, profit will be the main goal. This landuse concept could be the least possible due to the severity of constraints which hinder the real possibility of implementation.

Residential landuse may not be an option now but could be part of a phasing plan which turns the site into housing after the 20 year time limit. Since this would be the final piece in a phasing plan, it would largely depend on supply and demand in the real estate market. Currently, Waldoboro, Maine has 133 homes for sale according to Zillow.com, which means creating a new housing development is not in the best interest of this site. In the future if demand goes up, developing this site for residential use would be ideal in order to preserve surrounding greenfield sites.

4.5: Final Master Plan

The final design of the site includes elements of design and landuse options which were discussed in the conceptual phase of this chapter. A phasing plan has been implemented in order to maximize the potential use of the property while remediation is in use as well as maintaining site regulations such as restricted housing for 20 years, setbacks, and landuse requirements from the town. The final site plan incorporates the needs of the community as described in the town comprehensive planning documents while reusing a formerly developed, contaminated site and preserving surrounding greenfield parcels making this strategy an example of sustainability. This approach should be implemented for future growth especially in rural areas in order to preserve open green space. In the final section in this chapter, the master plan, phasing plans, detail plan, detail sections, and character images will be explained in detail along with their associated graphics.

The master plan Figure 4-17 is a compilation of the three different landuse concepts explored in the conceptual stage of design. Currently the site is zoned as Rural Village Business District. “The intent of the Rural Village Business District is to encourage small scale, residentially compatible business activities in Waldoboro’s historic rural crossroad neighborhoods.” (2005, Land Use Ordinance) The master plan of the Osram Sylvania site does just that by leaving buffers and creates a compact commercial village which prevents greater residential areas to be affected. The master plan allows for water access for canoes and kayaks with associated parking area, outdoor events space in the form of an amphitheater, more than 40,000 sq. ft. of commercial area, artist second floor studio space, and second floor residential space. A large area of the forested riparian buffer has been preserved only allowing access for the creation of the regional riverwalk trail which will connect the downtown area to the North and Medomak Meadows park to the South For this design three phases were created in order to maximize use on the site while remediation is being utilized to treat contamination.

Master Plan Site Program Elements

- Small scale commercial space
- Second floor artist studios

Figure 4-17 Master Plan

1 - 37,000 sq. ft. of Commercial Space
2 - 13 Residential Units
3 - Events Amphitheater
4 - River Access
5 - Skating Pond
6 - Preserved Forested Buffer
7 - Recreational Hiking Trails
8 - Comprehensive Plan River Walk

- Sculpture / Art walk and display area
- Skating pond for polishing remediation
- Entertainment and events green
- River access for canoe and kayak
- Picnic area along riverfront
- Outdoor area for farmers market and craft fairs
- Local seafood and ice cream
- Looping trail systems connecting to town planning riverwalk
- River overlook areas along path

The phasing plans are mostly designed around the remaining remediation schedule. Phase I incorporates a parks and recreation landuse on-site, making it possible for site use while remediation continues. Phytoremediation has been designed at the outflow of the Air Stripper unit currently in progress. The Air Stripper cleans the water to EPA "acceptable levels" which still contains trace amounts of contaminants. With the addition of phytoremediation, simulated rocky river for aeration, and a clarifying pond, contaminated groundwater from the site could reach potable water standards. Also, by adding these remediation techniques, it allows the community to visually see the contamination being cleaned and allowing them to interact with it in the form of signage, the river access road bisecting the remediation, and using the pond for ice skating in the winter. In Phase II of the master plan, commercial landuse can be incorporated after remediation has completed. In the final phase of the master plan, residential landuse can be utilized after the 20 year limit has been reached and has been incorporated here in the form of mixed use creating first floor commercial and second floor residential.

Phase I Recreation & Remediation

Phase I allows for use of the site by the community while remediation continues. This will allow for the community to interact with the process of site cleanup which will help them to understand the complexities of what happened, is happening, and will continue to happen on-site. In this part of the design, one of the major elements is the events amphitheater. The amphitheater is set into a steep slope and is made up of stone walls and sloped lawn areas for seating. A stone wall at the back of the stage area creates a ha-ha to look

Figure 4-18 Phase I - Recreation

1 - Events Amphitheater
2 - Phytoremediation
3 - Clarifying Pond
4 - Canoe & Kayak Access
5 - River Walk connecting down town to Medomak Meadows Park
6 - Recreation Hiking Trails

0 40 80 160

out over the top of the river access road. By utilizing the town of Amherst, Massachusetts parking requirements (Waldoboro currently has no specific parking requirements available) the amphitheater requires 60 parking spaces, based on: 1 space per 8 Ln. ft. of bench seating. Another major design element is the trail network both on-site and through the site with the regional riverwalk connecting downtown and Medomak Meadows Park. River access has been provided for canoes and kayaks along with river overlooks along the riverwalk trail. The last major design element is the incorporation of the system of remediation technologies and remediation pond which can be used as a skating pond in the winter and serves as a backdrop to events in the summer.

Phase II Commercial Village

In the future after remediation has completed, a commercial village can be added and will utilize town water and sewer available on-site. Phase I took advantage of the sites slope between terraces, Phase II is located on the top flat terrace and taking advantage of the sites topography. The commercial space added is approximately 17,600 sq. ft. with artist studio space on the second floor. The courtyard space created by the layout of the buildings can be utilized for smaller events such as farmer's market and craft fair types of activities. A seafood restaurant which can take advantage of the local seafood industry is one of several local food places which can inhabit this space. The entrance to the commercial section is through a stone planter with flowering ornamental trees which also serves as seating and through to an open lawn area. Section B, Figure 4-23, shows in detail the ornamental tree planters, while Section II shows the character of the commercial walkway. The associated parking for this section of design is approximately 65 spaces based on commercial parking requirements of Amherst, MA.

The feel of the commercial village is one of old architecture with hand painted signs and window boxes, individual commercial buildings, brick walks lined with granite, and sugar maple lined streets. In order to portray the design sense of the commercial area a selection of local character images have been assembled in Figure 4-25. These images are of historic areas such as downtown Freeport, Maine, Wiscasset, Maine, Damariscotta, Maine and even in

Figure 4-19 Phase II - Commercial

1 - 17,600 sq. ft. of Commercial Space
2 - Open Courtyard Space
3 - Required 65 Space Parking
4 - Service Access

0 40 80 160

downtown Waldoboro. These images show the individual buildings which have different finishes, one is set back while another is pulled forward and all of varying heights.

Phase III Mixed Use

The final phase in brownfield reuse of the Osram Sylvania site is the addition of a mixed use commercial and second floor living space after the remaining brownfield restrictions have been lifted. The residential space is restricted for 20 years after the completion of remediation of soil and groundwater contamination. By keeping the residential landuse in the final stage of site reuse, it allows time for the housing market to recover and create demand for more commercial space in conjunction with the second phase. The structures of this phase are oriented similar to before where they create an open courtyard area in the center which could be used for small community events or outdoor sculpture and art displays. There are an additional 80 parking spots implemented for the final phase of design with the addition of 19,300 sq. ft. of commercial space and 13 residential units. The design takes vehicular traffic though a loop road to exit on the second Osram Sylvania property, making it a one-way traffic pattern through all the parking areas. This will create a smoother experience for visitors and reduce confusion.

Detail Plan

The detail plan Figure 4-21 shows the upper part of the site in a larger scale in order to show more design elements. In the detail plan, vegetation and circulation patterns are clearer. At the entrance of the site a drop off area was designed for deliveries, farmer's market setup, and an area for commercial service needs. Another similar access point was created directly across the commercial area, except it provides access to the basement floor where each residence has a covered parking spot and each business has secure storage area.

This plan also shows the connections of the last two phases of design. An enclosed seating area surrounded by seating wall is located in front of the restaurant and food building and an arbor bridges the gap open to drivers on Friendship Street in order to tie both phases together. The middle connection area can also serve as a display area for sculpture and outdoor art to help promote the artist community

Figure 4-20 Phase III - Mixed Use

1 - 19,300 sq. ft. of Commercial Space
2 - 13 Residential Units
3 - Required 80 Parking Spaces
4 - Basement Service Access

0 40 80 160

within the area.

Sections

Figures 4-22 to 4-24 are all detailed sections in particular areas within the design. Section A in Figure 4-22 is an illustration of the seating area in the middle of the courtyard created by the surrounding commercial buildings. It is within close proximity to the restaurant and food building making it ideal for outside dining. This area is framed by the same seating wall design language used throughout the master plan and separates the café style dining from the main brick walkways. To the interior, perennial garden and ornamental tree plantings help create an intimate space for users. The center walk is made up of cut granite which will provide a different character but tie in with the rest of the design. This outdoor seating area is a major design element which ties both phase I and Phase II together in the master plan.

Section B in Figure 4-23 is cut through the entrance to the site from the parking lot. The building on the left of the page is the food building and in section is showing an ice cream shop with a counter order window. The awning and facade help to keep with the character of the historic style, downtown architecture. Bench seating is planted with flowering ornamental trees for low canopy which will help screen the parking lot along with a row of Sugar Maple. To the right in Section B is an open lawn area available for events such as farmer's a market. Section C is cut through a commercial building and shows the typical brick walk with granite curb edging. It also shows the store front with hand painted signs, window boxes, and big picture windows in front. The walks are lit with traditional style lamp posts, and lined with Sugar Maples just on the outside of the granite curb. These two sections help show the relationship of architecture and the courtyard landscape at the interior of the commercial area.

Figure 4-24 are two sections showing landscape elements in a larger scale. Section D was cut through the amphitheater in order to illustrate the slopes involved in this design element. Each stone seating wall is 18" with a slope in between of 12", creating a true amphitheater experience of sight lines and acoustics. Section E shows the different stages in remediation in Phase I with the Air Stripper unit discharging into phytoremediation which in turn discharges

Figure 4-21 Detail Plan

water into a rock swale to encourage aeration, and finally into the clarifying pond. The clarifying pond will be the only element to remain after remediation is complete, but can be used for ice skating in the winter and a backdrop for events in the summer.

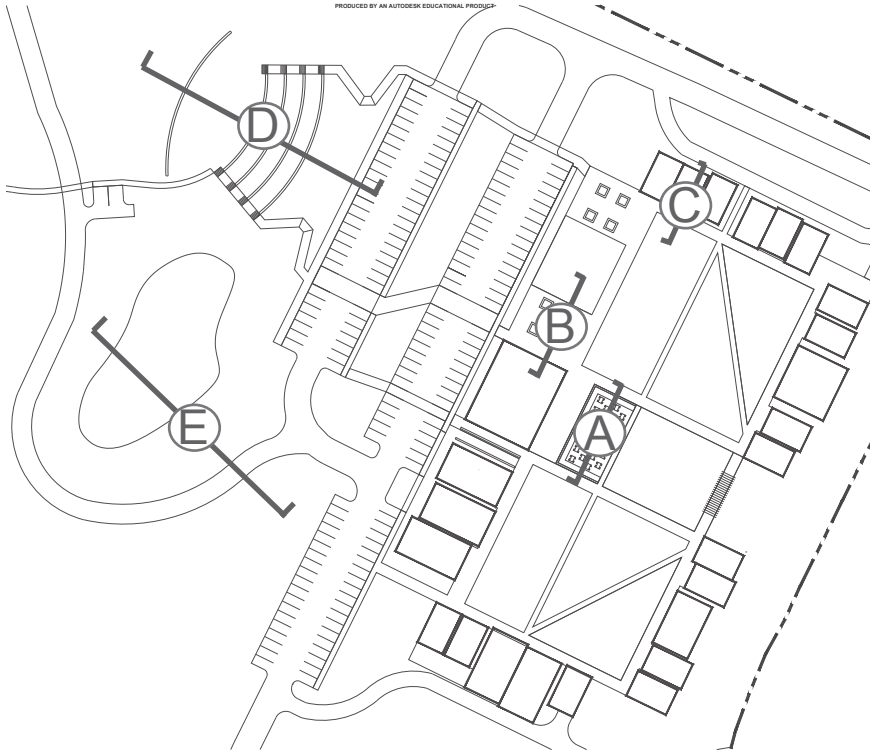


Figure 4-22 Sections

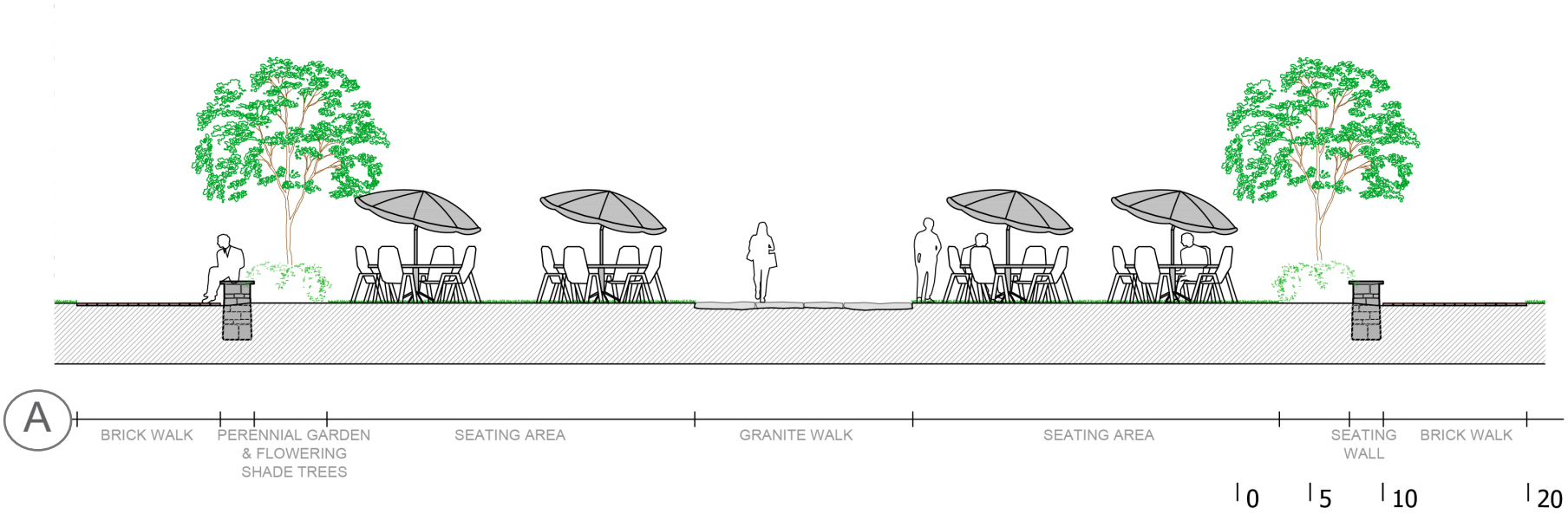
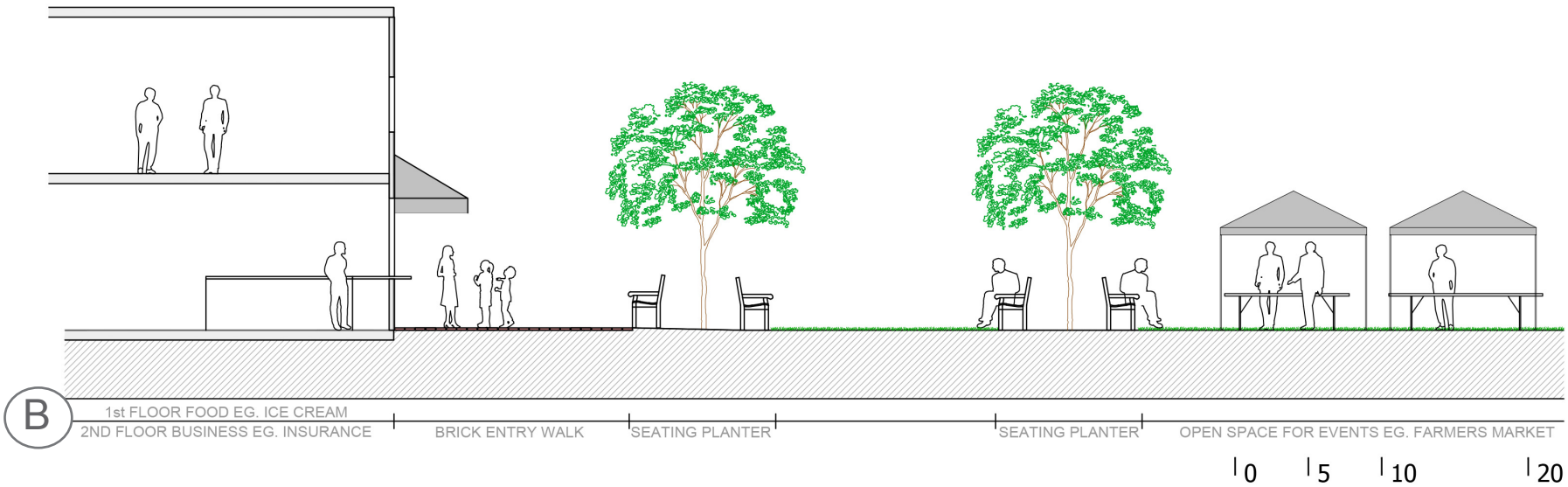


Figure 4-23 Sections



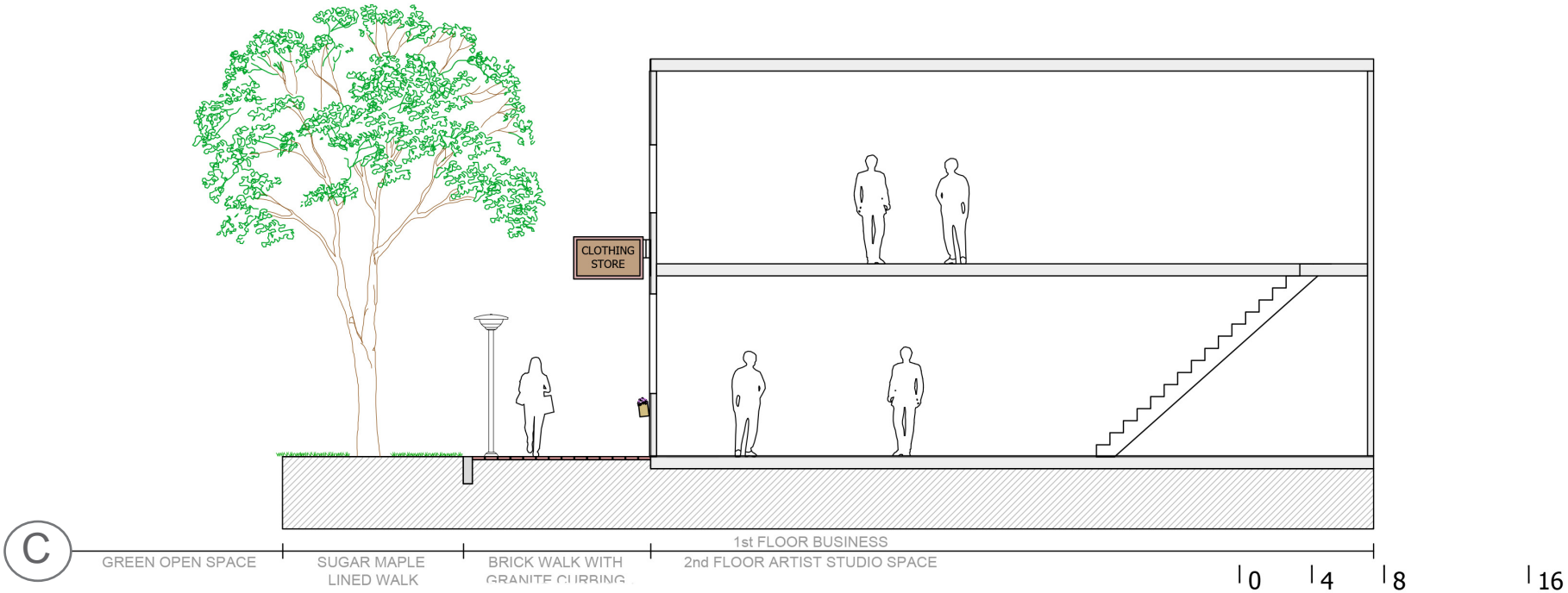


Figure 4-24 Sections

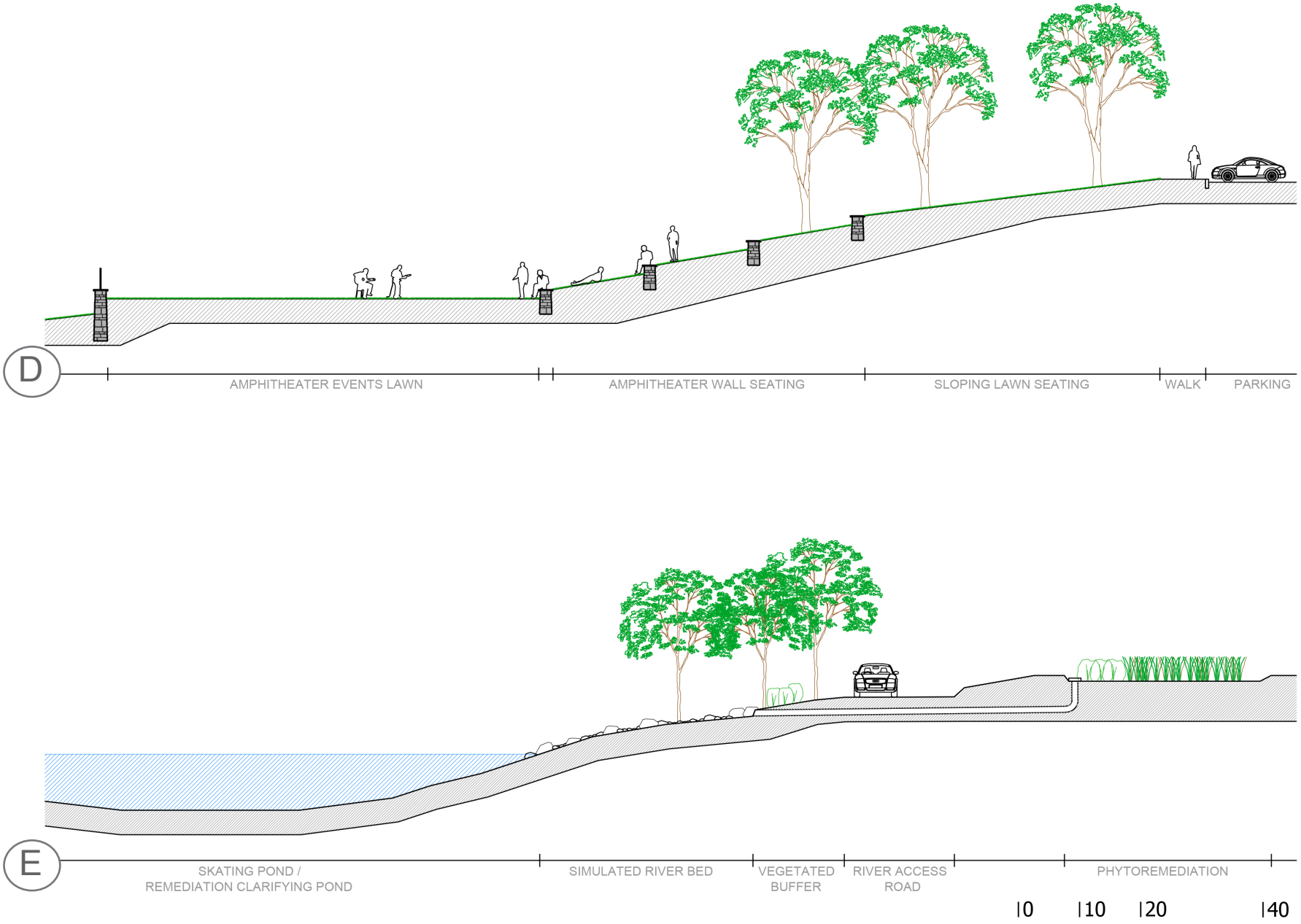


Figure 4-25 Character Images

mbasic.facebook.com

Main Street Damariscotta, Maine

carlascreations7.blogspot.com

Main Street Freeport, Maine

pandorama.com

Bath RD Wiscasset, Maine

maineanencyclopedia.com

Friendship Street Waldoboro, Maine

Chapter 5

Conclusion

The goal of this project was to develop a community revitalization plan that incorporates remediation practices, includes visual education for the community, and complete reuse strategy for the 39 acre site to link a historic downtown and revitalize the community. In order to achieve that goal, research on brownfield remediation strategies, funding and policy both at the federal and state levels, planning and reuse, rural brownfields as well as research on town comprehensive planning documents was a significant part of this project. Along with literature review of these types of brownfield characteristics, it was also important to discover similar case studies within the state of Maine. This was an important step to determine where possible funding may come from, what types of processes are used in-state, and what types of uses are permissible on a brownfield site.

In order to fully understand a brownfield site it was necessary to be informed about the technical aspect of them. Researching what types of contamination pollute these sites and how to remediate them are all very important to understanding significant details when designing a particular site. In this case, it was important to understand how contamination is migrating across the site from underneath the existing foundations and what is currently being done to remediate the contaminated groundwater before it reaches a major water body. The landscape design was guided by the types of uses permitted during this type of remediation process.

Community was also a very significant aspect to the design considerations for the master plan of this site. It is always important for landscape architects to consider the users of the site, which in a lot of instances is the community. Their needs and wants which were documented in Rethink, Reimagine, Revitalize Waldoboro were all carefully analyzed and were the driving force behind the final design of this site. Brownfields are an important tool for landscape architects because they are contaminated resources only few of which are reused to create aesthetically pleasing and functional redevelopments.

Brownfields are justifiable projects due to their threat to the environment and misuse of valuable land. These sites provide a prime location to apply those artistic and scientific principles as is the definition of landscape architecture and

revitalize built environments which were previously unsafe and even hazardous to human health and well-being. The project site characteristics, location, and contamination brought together many principles of landscape architecture into a final project which can be utilized in many other brownfield revitalization projects.

Works Cited

"Basic Information." EPA. Environmental Protection Agency, n.d. Web. 11 Feb. 2014.

Bengtson, Paul. Brownfield Remediation for Public Space. Thesis. University of Massachusetts at Amherst, 2002. N.p.: n.p., n.d. Print.

Benore, Andrew. "DEP's Osram Sylvania's Plan Would Continue Treatment, Restrict Use of Land." The Courier Gazette 24 Aug. 2011: n. pag. Print.

"Cianbro's Eastern Manufacturing Celebrates Grand Opening." The City of Brewer. MaineBusiness.com, 15 Aug. 2008. Web. 17 Feb. 2014.

Cromartie, John, and Timothy Parker. "USDA ERS - Rural Classifications: What Is Rural?" USDA ERS - Rural Classifications: What Is Rural? N.p., 30 Dec. 2013. Web. 30 Jan. 2014.

The Economic Development Commitee, Lachman Architects and Planners, and Regina Leonard Landscape Architecture. Waldoboro Downtown Revitalization Master Plan. Rep. N.p.: n.p., 2011. Print.

EPA Region 1 Brownfields Team. Brownfields 2007 Grant Fact Sheet Camden, ME. Rep. N.p.: United States Environmental Protection Agency, 2007. Print.

Gans, Deborah, and Claire Weisz. Extreme Sites: The Greening of Brownfield. London: Wiley-Academy, 2004. Print.

Geltman, Elizabeth Glass. Recycling Land: Understanding the Legal Landscape of Brownfield Development. Ann Arbor: University of Michigan, 2000. Print.

"Geography." 2010 Urban and Rural Classification. U.S. Census Bureau, n.d. Web. 28 Jan. 2014.

Hauger, NOK-NOI. "'THAT WAS OUR MILL'; Investing in Maine's Legacy: Breathing New Life into the Buildings of a Lost Era." Bangor Daily News [Bangor, ME] 07 Oct. 2006, A1 sec.: n. pag. Print.

Hendrickson, Chris, Deborah Lange, Yeganeh Mashayekh, Amy Nagengast, and Shengnan Zhang. "Estimation of Comparative Life Cycle Costs and Greenhouse Gas Emissions of Residential Brownfield and Greenfield Developments." Diss. Carnegie Mellon University, n.d. Brownfields Road Map to Understanding Technology Options for Site Investigation and Cleanup. Department of Civil & Environmental Engineering. Web. 29 Jan. 2014.

Hollander, Justin B., Naill G. Kirkwood, and Julia M. Gold. "The Essential Principles of Brownfields Regeneration." Planetizen: The Urban Planning, Design, and Development Network. N.p., 20 Sept. 2010. Web. 06 Feb. 2014.

Hula, Richard C., Laura A. Reese, and Cynthia Jackson-Elmoore. Reclaiming Brownfields: A Comparative Analysis of Adaptive Reuse of Contaminated Properties. Farnham, Surrey, England: Ashgate, 2012. Print.

Land and Community Revitilization. Maine Street Station, Brunswick, Maine. Rep. Brunswick: Brownfields Success in New England, 2008. Print.

Lofton, Jeff. "ASLA: Glossary." ASLA: Glossary. American Society of Landscape Architects, n.d. Web. 21 Feb. 2014.

National Association of Development Organizations. Brownfields Resource Guide for Rural and Small Communities. Publication. N.p.: NADO Research Foundation, 2004. Print.

"National Brownfield Association." National Brownfield Association -About Us - What Is a Brownfield? National Brownfield Association, 2014. Web. 29 Jan. 2014.

Sarni, William. Greening Brownfields: Remediation through Sustainable Development. New York, NY: McGraw-Hill, 2010. Print.

Sleegers, Frank. “Phytoremediation as Green Infrastructure and a Landscape of Experiences.” Proceedings of the ANnual International Conference on Soils, Sediments, Water and Energy 15.13 (2010): n. pag. Web. 6 Feb. 2014.

Sousa, Christopher A. De. “Turning Brownfields into Green Space in the City of Toronto.” Landscape and Urban Planning 62.4 (2003): 181-98. Print.

Spills and Site Cleanup. “Remediation Program Guidance: Guidance for the Investigation and Clean-up of Hazardous Substance Sites in Maine.” Remediation Program Guidance, Remediation and Waste Management Guidance/Guidelines, Bureau of Remediation and Waste Management, Maine Department of Environmental Protection. Maine DEP, n.d. Web. 25 Feb. 2014.

Steeves, Heather. “Waterfront Land for Free in Camden.” Bangor Daily News [Bangor, ME] 15 Sept. 2010: n. pag. Print.

Thompson, J. William., and Kim Sorvig. Sustainable Landscape Construction: A Guide to Green Building Outdoors. Washington: Island, 2008. Print.

The Town of Waldoboro, Maine, and The Community Visioning Steering Commitee. Rethink, Reimagine, Revitalize Waldoboro. Rep. Final ed. N.p.: n.p., 2010. Print.

United States Environmental Protection Agency, and Office of Solid Waste and Emergency Response. Green Remediation Best Management Practices: Pump and Treat Technologies. N.p.: Office of Superfund Remediation and Technology Innovation, December 2009. Print.

United States. Environmental Protection Agency. Sustainable Reuse—Ensuring That a Brownfield's Reuse Offers the Greatest Social, Economic, and Environmental Benefit to the Community. By Solid Waste and Emergency Response. N.p.: n.p., 2003. Print.

U.S. Census Bureau. "2010 Census." 2010 Census. N.p., n.d. Web. 11 Feb. 2014.

U.S. EPA, Argonne National Laboratory, and U.S. Army Corps of Engineers. "Site Type: Glass Manufacturing." Brownfields Road Map to Understanding Technology Options for Site Investigation and Cleanup. Brownfields and Land Revitalization Technology Support Center, n.d. Web. 29 Jan. 2014.